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Approaches to promote handwashing and sanitation behaviour change in low- and middle-income countries: a mixed method systematic review

Emmy De Buck, Hans Van Remoortel, Karin Hannes, Thashlin Govender, Selvan Naidoo, Bert Avau, Axel Vande veegaete, Alfred Musekiwa, Vittoria Lutje, Margaret Cargo, Hans-Joachim Mosler, Philippe Vandekerckhove, Taryn Young

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Table of contents

Plain language summary

Community-based approaches are most effective in promoting changes in hygiene practices, but sustainability is a challenge

Community-based approaches to promote handwashing and sanitation efforts seem to work better than social marketing, messaging and interventions based on psychosocial theory. Programs combining hygiene and sanitation measures appears to have a larger impact than either one alone.

What is this review about?

Diarrhoeal diseases are very common causes of death in low and middle-income countries. Improved sanitation and hygiene reduce diarrhoea, but adoption remains a challenge.

This review assesses the evidence for two questions: (1) how effective are different approaches to promote handwashing and sanitation behaviour change; and (2) what factors influence the implementation of these approaches?

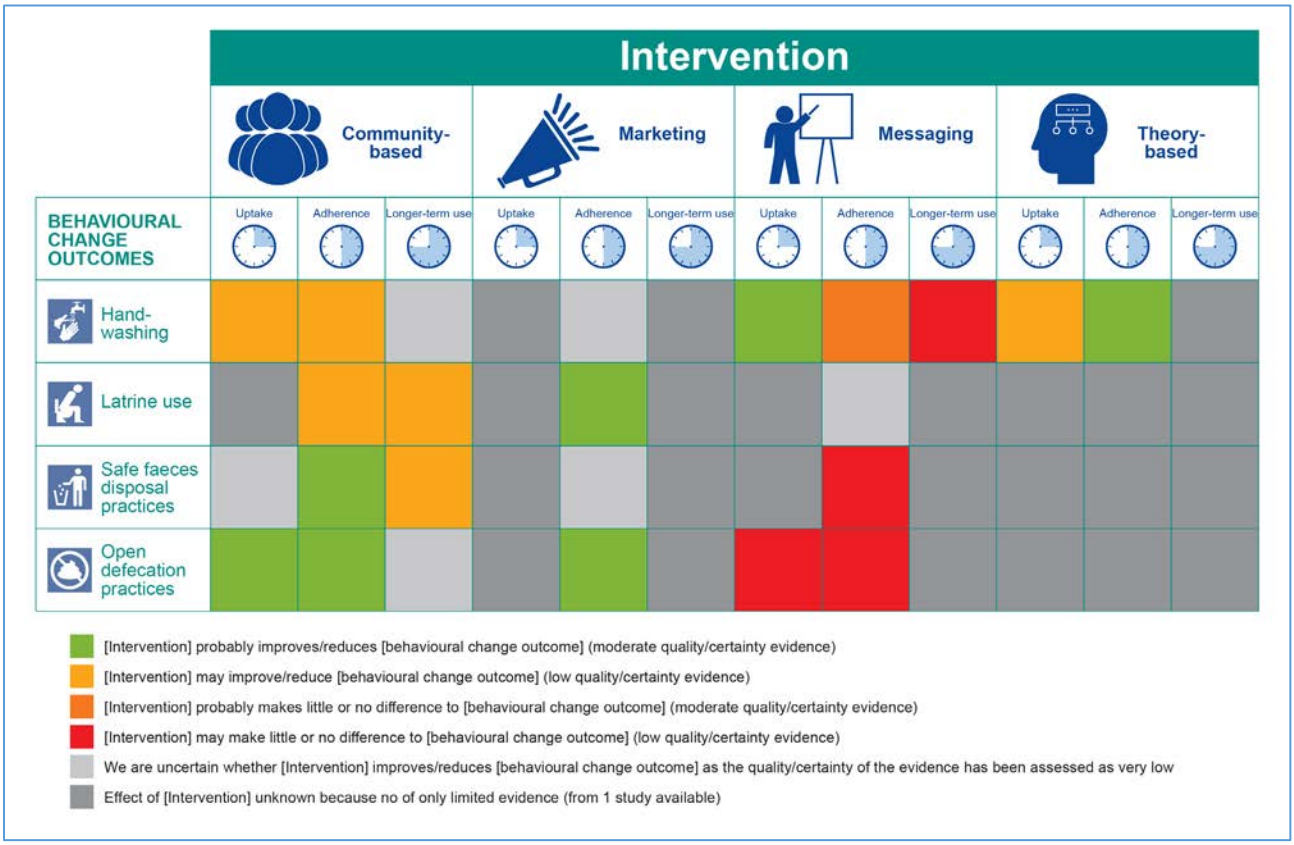
What is the aim of this review?

This Campbell Systematic Review examines the effectiveness of different approaches for promoting handwashing and sanitation behaviour change, and factors affecting implementation, in low and middle-income countries. The review summarises evidence from 42 impact evaluations, and from 28 qualitative studies.

What studies are included?

Studies of effectiveness had to be impact evaluations using an experimental or quasi-experimental design and analytical observational studies. Implementation studies used qualitative designs.

Forty-two quantitative studies and 28 qualitative studies met the inclusion criteria. The quantitative studies were conducted in LMICs worldwide, with the majority of the studies in South Asia and Sub-Saharan Africa.



What are the main findings of this review?

Community-based approaches which include a sanitation component can increase handwashing with soap at key times; use of latrines and safe disposal of faeces; and reduce the frequency of open defecation. **Social marketing** seems less effective. The approach mainly shows an effect on sanitation outcomes when interventions combine handwashing and sanitation components.

Sanitation and hygiene messaging with a focus on handwashing with soap has an effect after the intervention has ended, but there is little impact on sanitation outcomes. However, these effects are not sustainable in the long term. Using **elements of psychosocial theory** in a small-scale handwashing promotion intervention, or adding theory-based elements such as infrastructure promotion or public commitment to an existing promotional approach, seem promising for handwashing with soap.

None of the approaches described have consistent effects on behavioural factors such as knowledge, skills and attitude. There are no consistent effects on health.

What factors affect implementation?

Implementation is affected by length of the intervention; visit frequency; use of short communication messages; availability of training materials; kindness, respect, status and accessibility of the implementer; recipient awareness about costs and benefits and their access to infrastructure and social capital.

For **community-based approaches**, involvement of the community, enthusiasm of community leaders, having a sense of ownership, the implementer being part of the community, gender of the implementer, trust, income generating activities, clear communication and developing a culture of cooperation facilitated implementation.

For **sanitation and hygiene messaging**, text messages should be short and culturally appropriate, passive teaching methods in schools and reminders should be frequent and over a long period. Barriers include illiteracy and a lack of interest and involvement from the family in case of a school intervention. For the **social marketing approach** barriers were mainly about the use of sanitation loans such as lack of communication to latrine business owners about which area to cover, loan processing times and sanitation loans not reaching poor people.

What do the findings of this review mean?

Promotional approaches aimed at handwashing and sanitation behaviour change can be effective in terms of handwashing with soap, latrine use, safe faeces disposal and open defecation. A combination of different promotional elements is probably the most effective strategy. Identifying and tackling the different barriers and facilitators that influence the implementation of these promotional approaches can increase effectiveness.

An important implication for research is that there is a need for a more uniform method of measuring and reporting on handwashing, latrine use, safe faeces disposal, and open defecation.

How up-to-date is this review?

The review authors searched for studies published until March 2016; this Campbell Systematic Review was published in May 2017.

Executive summary/Abstract

BACKGROUND

Water and sanitation are at the very core of sustainable development, critical to the survival of people and the planet. The Sustainable Development Goal 6 (i.e. 'ensure availability and sustainable management of water and sanitation for all') addresses the issues relating to drinking water, sanitation and hygiene. It is unclear which Water, Sanitation and Hygiene (WASH) promotional approach is the most effective for sanitation and hygiene behaviour change, and other outcomes leading to behaviour change (e.g. learning outcomes) or longer term outcomes that follow from behaviour change (e.g. mortality, morbidity).

OBJECTIVES

The overall goal of this systematic review is to show which promotional approaches are effective in changing handwashing and sanitation behaviour, and which implementation factors affect the success or failure of such interventions. This goal is achieved by answering two different review questions.

Question 1: What is the effectiveness of different approaches for promoting handwashing and sanitation behaviour change, in communities in low- and middle-income countries?

Question 2: What factors influence the implementation of approaches to promote handwashing and sanitation behaviour change, in communities in low- and middle-income countries?

SEARCH METHODS

A comprehensive search was conducted to identify both published and unpublished studies. Using a sensitive search strategy, we searched the following databases from 1980 to March 2016: Medline (PubMed), Cochrane CENTRAL Issue 2, Applied Social Sciences index and abstracts (ASSIA, ProQuest), Global Health (CABI), EMBASE (OVID), PsycInfo (EBSCOHost), ERIC (EBSCOHost), Global Index Medicus, 3ie Impact Evaluation Database, International bibliography of the Social Sciences (IBSS, ProQuest), Sociological abstracts (ProQuest) and Social Sciences citation index (SSCI, Web of Science). To find unpublished material and relevant programme documents, we contacted various research groups and organizations and/or checked the relevant websites.

SELECTION CRITERIA

Participants included both children and adults from low- and middle-income countries (LMICs), as defined by the World Bank, at the time the intervention was implemented. Studies performed at an individual, household, school or community level were included, whereas studies conducted in institutional settings (e.g. hospitals) were excluded. The following promotional approaches or elements to promote handwashing, latrine use, safe faeces disposal, and to discourage open defecation (primary outcomes), were included: community-based approaches, social marketing approaches, sanitation and hygiene messaging and elements of psychosocial theory. Secondary outcomes of interest were behavioural factors (knowledge, skills, attitude, norms, self-regulation) and health outcomes (morbidity, mortality).

For Question 1 (effectiveness of promotional approaches), we included impact evaluations using an experimental, quasi-experimental design and observational analytical studies. To answer Question 2 (implementation aspects), all qualitative study designs addressing factors influencing implementation of the promotional approaches were considered for inclusion. This included, for example, grounded theory, case studies, phenomenological studies, ethnographic research, action research and thematic approaches to qualitative data analysis.

DATA COLLECTION AND ANALYSIS

Study selection and data extraction (including risk of bias assessment) were performed independently by two reviewers, using EPPI-Reviewer software. Study authors of all included papers were contacted by email (in July 2016) to ask for any relevant information, related to the population, intervention or outcomes, that was missing or not reported in the paper. Any disagreements between the two data extractors were resolved through discussion, or by consulting another review co-author. The GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach was used to assess the overall quality/certainty of evidence from quantitative studies included in this review. The qualitative studies were assessed using the CASP (Critical Appraisal Skills Program) checklist. Evidence relating to Question 1 (effectiveness of promotional approaches) was synthesized in a quantitative way (meta-analysis), where possible.

RESULTS

Forty-two quantitative studies and 28 qualitative studies met the inclusion criteria. The quantitative studies were conducted in LMICs worldwide, with the majority of the studies in South Asia and Sub-Saharan Africa. Most quantitative studies (69%) were performed in a rural setting and only 14% of the studies took place in an urban setting (with an additional 10% in an “informal-rural setting”). The effect of a promotional approach versus not using a promotional approach on sanitation and handwashing behaviour change, behavioural factors (knowledge, skills, attitude, norms and self-regulation) and health-related outcomes (morbidity and mortality), was studied in 34 different studies. In addition, 7 studies compared specific promotional approaches versus other promotional approaches, and one study compared two different communication strategies. All

studies showed substantial variability in programme content, study types, outcome types, methods of outcome measurement and timing of measurement.

Risk of bias assessments of included studies were influenced by unclear reporting or lack of reporting of key methodological aspects of the study design and process. Five percent of the experimental studies (n=2) had a high risk of selection bias, 40% had a high risk of detection bias (n=17), 28% had a high risk of attrition bias (n=12) and 48% had a high risk of reporting bias (n=20). Most quasi-experimental and observational studies had bias in the selection of participants, some were at high risk of confounding, methods of outcome assessment were not comparable across intervention groups, and outcome assessors were aware of the interventions that the groups received. For the body of evidence, in most assessments, the certainty of evidence was considered as 'low' and in some cases 'moderate' or 'very low'. For the qualitative studies, an overall CASP score was given to the studies, and only 21% of the studies had a score less than 8/10. In studies with a lower score the relationship between researcher and participants was not adequately considered or ethical issues were not explicitly reported.

We categorised the studies into 4 categories of promotional approaches or elements:

(1) **community-based approaches**, a promotional approach where there is typically community involvement and engagement, and shared decision-making is part of the approach. All but one study in this category implemented a sanitation intervention, in some cases combined with a handwashing with soap and/or water supply/water quality component.

(2) **social marketing approaches**, a promotional approach combining enterprise approaches with demand stimulation, and assuming that people both want and are able to change their behaviour. All but two studies in this category implemented a handwashing with soap intervention, in some cases combined with a sanitation and/or water supply/water quality component.

(3) **sanitation and hygiene messaging**, is a predominantly directive educational approach, consisting mainly of one-way communication, designed to help individuals and communities improve their health, by increasing their knowledge and/or skills. All but one study in this category implemented a handwashing with soap intervention, in some cases combined with a sanitation and/or water supply/water quality component.

(4) **elements of psychosocial theory**, which are derived from a formal psychosocial theory and form the basis of the intervention. All but one study in this category implemented a handwashing-only intervention, and one study implemented a combined handwashing and sanitation intervention.

The most consistent results were obtained within the category of **community-based approaches**, where at least a sanitation component was part of the programme. Working in a community-based way may be effective in terms of handwashing with soap, and sanitation outcomes (latrine use, safe faeces disposal, and open defecation). Limited positive results on the knowledge of key handwashing times were found. Influencing factors that could play a specific role in the implementation of community-based interventions are: a facilitator (e.g. health promoter, community leader) that is part of and representative of the community, the attitude of the

implementer/facilitator, providing enough information, and creating a culture of cooperation. In addition, the gender of the facilitator seems to play an important role, since women prefer to discuss private issues with somebody of the same sex.

The use of **social marketing approaches** seems to be less uniformly applicable, and mainly show an effect on sanitation outcomes when interventions have a combined handwashing and sanitation component. A specific barrier that could play a role in the implementation of social marketing interventions was the use of sanitation loans (slow and expensive process, not reaching the poor and people with lack of financial knowledge). Additional income generation would be an important facilitator for this type of approach.

Sanitation and hygiene messaging, with a focus on handwashing with soap, seem to have an effect on handwashing programmes immediately after the intervention has ended. However, these effects are not sustainable in the long term. This type of promotional approach may make little or no difference to sanitation outcomes. With this approach it seems key that messages are delivered using active teaching methods and that messaging is innovative and culturally sensitive. In case of school level interventions with children, the duration of the intervention and involving the children's parents seem to be positive influencing factors.

Using **elements of psychosocial theory** in a small-scale handwashing promotion intervention, or adding theory-based elements such as infrastructure promotion or public commitment to an existing promotional approach, seems promising for handwashing with soap.

Finally, the methods used for communicating the content of a certain promotional approach, also play a role, and use of interpersonal communication was shown to be effective in certain circumstances.

We only found a limited number of studies that incorporated a range of incentives (from soap bars to food or subsidies) into the promotional approach. One study reported promising results when using subsidies as part of the community-based approach, but more research on the use of subsidies and incentives would be valuable.

None of the promotional approaches described in the review showed consistent effects on behavioural factors such as knowledge, skills and attitude. Also no consistent effects on health were demonstrated.

Facilitators which were relevant across different promotional approaches were: length of the approach, visit frequency, using short communication messages, availability of training materials, funding/resources and partnerships, kindness and respect of the implementer, accessibility of the implementer, and the implementer's authority/status; as well as, on the side of the recipient, awareness about costs and benefits, social capital, access to infrastructure and availability of space, and others showing the behaviour.

AUTHORS' CONCLUSIONS

Implications for policy and practice. Based on our findings, promotional approaches aimed at handwashing and sanitation behaviour change can be effective in terms of handwashing with soap, latrine use, safe faeces disposal and open defecation. Findings from experimental, quasi-experimental design and observational analytical studies show that a combination of different promotional elements is probably the most effective strategy. The recognition of different barriers and facilitators that influence the implementation of these promotional approaches may have a triggering effect on its effectiveness.

Implications for research. An important implication of our work is that there is an urgent need to use a more uniform method of outcome measurement (type of outcomes, way of assessment, timing of assessment). This will facilitate making conclusions on the effects of promotional approaches in the future. In addition, it is important to further assess barriers and facilitators, identified in this review, alongside quantitative analyses of promotional approaches.

1 Background

1.1 THE PROBLEM, CONDITION OR ISSUE

Diarrhoeal diseases are the second highest cause of death in low income countries and the fifth highest cause of death in the world (WHO, 2011). In an update of the Global Burden of Disease study it was shown that unsafe water, sanitation and handwashing caused nearly 5% of DALYs (Disability-Adjusted Life Years) for males and females in poor communities (GBD Risk Factor Collaborators, 2015).

Water, Sanitation and Hygiene (WASH) interventions consist of (1) water supply (water quantity) and water treatment (water quality), including operation and maintenance of the water source ("Water"), (2) latrine construction, latrine use, latrine hygiene, faeces disposal practices, discouraging the practice of open defecation, disposal of solid waste and wastewater, and vector control ("Sanitation"), and (3) promotional activities around personal hygiene (e.g. handwashing, facial washing, showering/bathing practices, menstrual hygiene) and domestic hygiene ("Hygiene") (DFID, 2013). The actual construction of WASH interventions, such as construction of a water source or latrine, is called the "hardware" element of the intervention. On the other hand, implementation of participatory approaches to promote safe hygiene practices, establish community-based management systems for the WASH facilities, create up-front demand and encourage community participation and ownership is called the "software" element of the intervention (Peal et al., 2010). The latter is particularly important to ensure long term sustainability of behaviours and technical durability of facilities since it was shown that the impact of WASH interventions on the burden of disease falls over time (Cairncross et al., 2010; Waddington et al., 2009).

One of the targets of the Millennium Development Goals was to halve the number of people without sustainable access to safe water and sanitation by 2015. In 2012 it was published that the target for water supply had been met, however, 780 million people still do not have access to safe water, with rural populations having five times less access than urban populations. The target for sanitation has not been met at all, and it is estimated that 2.5 billion people have no access to improved sanitation, with Sub-Saharan Africa having 30% access and South Asia having 41% access. Moreover, 1.1 billion people still practice open defecation (WHO/UNICEF, 2010; DFID, 2013).

1.2 THE INTERVENTION

1.2.1 Approaches to promote behaviour change

To improve effectiveness of WASH interventions, increasing attention is currently being focused on the design of programmes and the selection of approaches to promote WASH behaviour change. Several approaches have been developed over the last two decades, and are currently being applied in practice to promote uptake of WASH interventions and to achieve WASH behaviour change (Peal et al., 2010). The approaches can be grouped in the following categories:

- **Community-based participatory approaches** (as in the case of programmes such as Community Led Total Sanitation (CLTS), Participatory Rural Appraisal (PRA), Participatory Hygiene and Sanitation Transformation (PHAST), Self-esteem, Associative Strengths, Resourcefulness, Action-Planning, and Responsibility (SARAR), community reunion, community hygiene club/mother club, community health clubs (CHC), child-to-child approach (CtC), Urban Led Total Sanitation (ULTS), Community Approaches to Total Sanitation (CATS), Methodology for Participatory Assessments (MPA), Community Action Planning (CAP), Child Hygiene and Sanitation Training/Transformation (CHAST), and the model home approach). A promotional approach is considered a "community-based approach" when one of the above-mentioned programmes is reported, or where it is clearly indicated that community members are invited and there is shared decision-making. A community-based approach works with the whole community, and typically community meetings which trigger behaviour change are conducted.
- **Social marketing approaches**, including: (1) marketing of a single intervention (e.g. Saniya, Public Private Partnership for Handwashing with Soap (PPPHWS)), (2) marketing of sanitation goods and services (e.g. Support to Small Scale Independent Providers (SSIP), SaniMart, SanMark, Total Sanitation and Sanitation Marketing (TSSM)). Social marketing is the use of commercial marketing techniques to promote the adoption of behaviour that will improve the health or well-being of the target audience or of society as a whole (Peal, 2010). The approach combines enterprise approaches with demand stimulation, and assumes that people both want and are able to change their behaviour. A marketing approach focuses on "the 4 P's": Product (e.g. handwashing facility), Price (e.g. price of soap), Place (products need to be easily available) and Promotion (e.g. encourage adoption of certain behaviours). The social marketing concept holds that the organisation's task is to determine the needs, wants, and interests of target markets and to deliver the desired satisfactions more effectively and efficiently than competitors, in a way that preserves or enhances the consumer's and the society's well-being (Kotler et al., 2005).
- **Sanitation and hygiene messaging**: sanitation and hygiene messaging is a predominantly directive educational approach, consisting mainly of one-way communication, designed to help individuals and communities improve their health, by increasing their knowledge and/or skills. Within the theme of this systematic review, sanitation and hygiene messaging aims to educate about health-related aspects of handwashing and sanitation, such as hygiene, diarrhoea transmission, and the relationship between germs and health.

- **Elements of psychosocial theory**: behavioral factors (e.g. knowledge, feelings, social pressure) are derived from psychosocial theories, and then are addressed with interventions (as in the case of programmes such as Focus, Opportunity, Ability, Motivation (FOAM), IBM-WASH, Access Build Create Deliver Evaluate (ABCDE), Evo-Eco or BCD Behaviour Determination model, and RANAS). These elements of psychosocial theory are initially derived in smaller scale studies and should be incorporated in a larger promotional approach, to be able to implement at scale.
- **Incentives**: (1) financial (national government subsidies programmes, community-based cross subsidies, vouchers, cash transfers, loans/micro-credits) or (2) non-financial (e.g. food). As with elements of psychosocial theory, incentives are only a promotional element that should be incorporated in a larger promotional approach.
- **Advocacy** (activities targeting policy/decision makers, for example community meetings or shifting perception of general public like events with celebrities). Advocacy activities can be incorporated in a larger promotional approach.
- Any combination of the promotional approaches or promotional elements mentioned above (Multichannel approach).

A promotional approach can contain different promotional elements, depending on the context for which the programme was developed. Based on the main focus or major element of the promotional approach, we classified the promotional approaches/promotional elements for the purpose of this review in 4 groups: community-based approaches, social marketing approaches, sanitation and hygiene messaging, and elements of psychosocial theory (detailed explanation below).

Any of the approaches above can be delivered using one or more different communication strategies:

- Interpersonal communication: peer to peer, home visits, focus group; either of these approaches could work with change/transformation agents such as hygiene promotors, WASH Committees, champions/natural leaders who are not part of community leadership system, community leaders (chefs, elected village/ appointed village leaders, councillors, etc.), religious leaders, teachers, Village Health Workers, Local Government Staff (dealing with WASH, Social Services, Health, etc.), volunteers (e.g. Red Cross volunteers), lecture, workshops, games, material provision with demonstration, quiz.
- Mass media communication: poster, TV, radio spot, radio programme, billboards, newspapers, outdoor/transit advertising, megaphones, hygiene day, stickers, paintings.
- Traditional communication: songs, folk drama and theatre, concerts, rallies, parades, cinema show.

It is not always clear which of these approaches is the most effective in relation to sanitation and hygiene behaviour change, and other outcomes leading to behaviour change (e.g. learning outcomes) or longer term outcomes that follow from behaviour change (e.g. mortality, morbidity). In the WASH sector, the evaluation of programmes tends to focus on intended outcomes and impacts (whether the intervention worked and what effect it had on outcomes) but not on appraising the process of implementation and establishing how the use of a specific approach leads to changes in outcomes. However, decision makers need to know the critical factors in the process

of implementation that ensure that impacts are achieved and sustained, and how scaling up is best achieved.

For the purpose of this review we focused on approaches to promote handwashing and sanitation interventions, with behaviour change as the main outcome. To be able to make this choice we developed a review of existing systematic reviews (see below, 1.4). Since adherence to water, sanitation and hygiene programmes is known to be highly associated with factors such as gender, socioeconomic status, education and occupation, equity factors are also considered in this systematic review (DFID, 2013). Since the effect of WASH interventions on health outcomes (such as diarrhoea, cholera, trachoma, helminth infections) has been shown in many existing individual studies and systematic reviews (Cairncross et al., 2010; Dangour et al., 2013; Fewtrell et al., 2005; Peletz et al., 2013; Stocks et al., 2014; Strunz et al., 2014; Taylor et al., 2015; Waddington, 2009), and practicing/showing the right behaviour is a pre-requisite for health impacts, health outcomes are also looked at in those studies that measured behaviour change. Although it would be relevant to include studies that measured cost-effectiveness, this is outside the review scope.

1.2.2 Definitions

In the context of this review, we used the following definitions:

Behaviour change: Influencing the intention, use and habit in the performance of a certain behaviour (Mosler, 2012).

Intention: Intention represents a person's readiness to practice a behaviour: how willing the person is to implement a behaviour (Mosler, 2012). Intention can include for example "partial construction" or "savings for latrine construction".

Use: Refers to the execution of actions. Both the desired behaviour and competing behaviours must be considered (Mosler, 2012). "Use" consists of uptake, adherence and longer-term use:

- **Uptake:** Uptake is defined as the actual use or non-use (Lillevol et al., 2014). For the purpose of this project we define this outcome as use during the implementation of the programme.
- **Adherence:** The extent to which a person continues an agreed-upon mode of treatment without close supervision (Online Medical Dictionary). For the purpose of this project we define this outcome as use until 12 months after the end of the programme's implementation.
- **Longer-term use:** This is defined as the continued practice of a WASH behaviour and/or continued use of a WASH technology. For the purpose of this project we define this outcome as the use >12 months after the end of the 'project period' (programme's implementation).

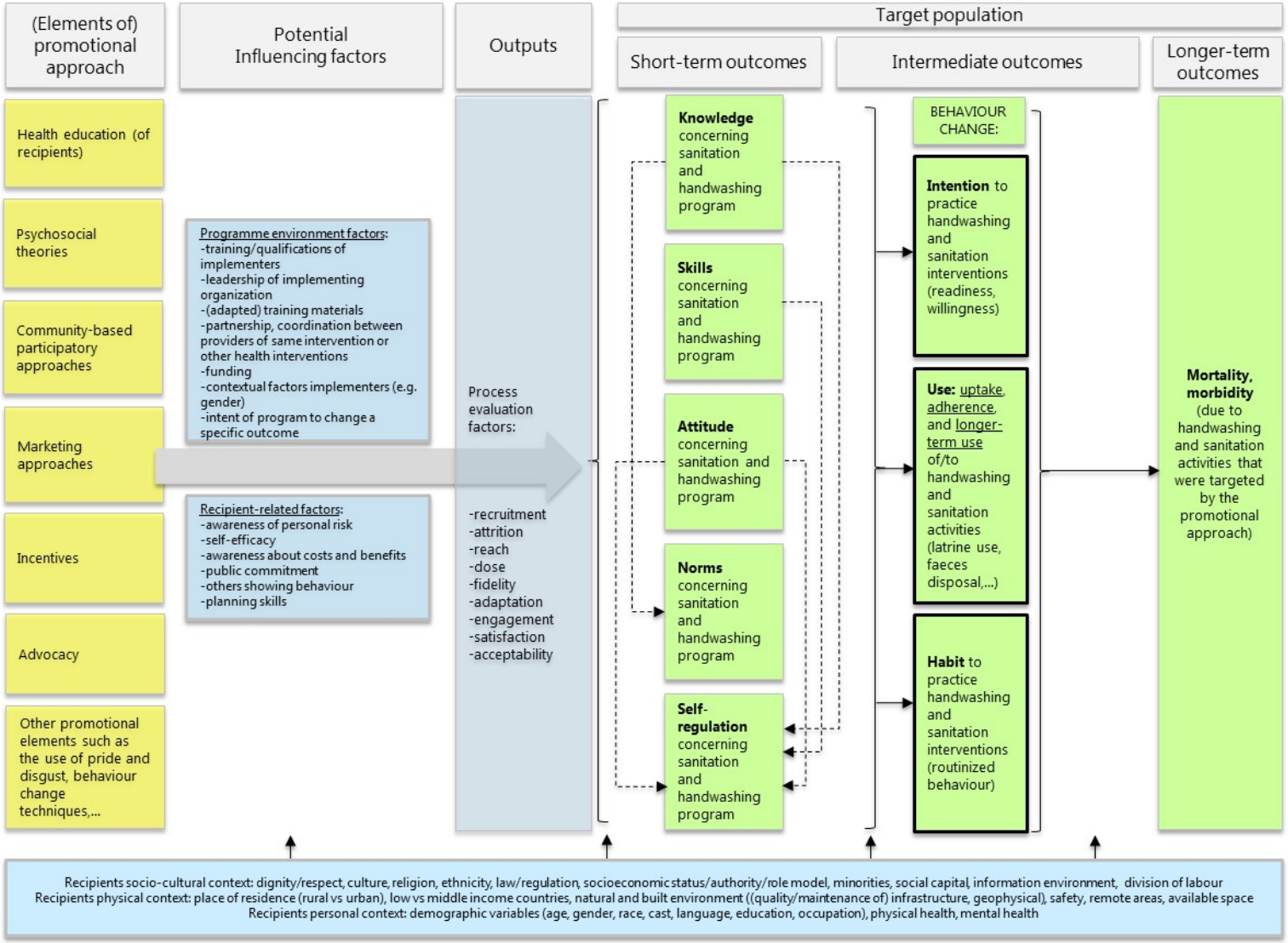
Habit: Habits are routinized behaviours that are executed in specific, repeating situations nearly automatically and without any cognitive effort (Mosler, 2012; Neal et al., 2015).

Promotional approach: a planned and systematic method which encourages people to adopt a specific behaviour (Peal et al., 2010; Aunger & Curtis, 2015; Mosler, 2012; Dreibelbis et al., 2013). Detailed promotional approaches are described below in the selection criteria.

1.3 HOW THE INTERVENTION MIGHT WORK

We have built a theory of change (ToC) framework illustrating the hypothesized causal links, explaining how (elements of) handwashing and sanitation promotional approaches are expected to lead to the intended short-term, intermediate and longer-term outcomes, and how different factors could influence the implementation of the promotional approaches (see Figure 1). The following sources were used to inform the ToC: a systematic review of WASH behavioural models (Dreibelbis et al., 2013), 6 systematic reviews that were included in the scoping phase (overview of existing systematic reviews, see below), the PROGRESS framework (O'Neill et al., 2014), the Checklist for implementation ("Ch-IMP") (Cargo et al., 2015), and the SURE framework (The SURE Collaboration, 2011). We also incorporated the input of our team and Advisory Group members. A more detailed list of the different sources of information is provided in Appendix 1. In addition, a more detailed description of how stakeholder engagement resulted in an improved version of the ToC will be published in a separate peer-reviewed publication.

Figure 1: Initial theory of change framework concerning the effect of promotional approaches intended to improve handwashing and sanitation behavioural factors (short-term outcomes), handwashing and sanitation behaviour change (intermediate outcomes) and reduce morbidity and mortality (longer-term outcomes)



Colour legend: Green boxes contain short-term, intermediate or longer-term outcomes. Primary outcomes are indicated in boxes with a black border. Blue boxes contain factors that can influence the implementation of the promotional approaches

The ToC contains 6 different (elements of) promotional approaches aimed at inducing handwashing and sanitation behaviour change. Furthermore, it contains (1) short-term outcomes, consisting of 5 "behavioural factors" (knowledge, skills and attitude, norms, self-regulation), (2) intermediate outcomes, consisting of the different elements that compose "behaviour change": intention, use and habit, and (3) longer term outcomes, including health outcomes such as mortality and morbidity due to agents with faecal-oral transmission. Health outcomes were included since these are the final intended outcomes for which behaviour change is a pre-requisite. However, data on health outcomes were only included from studies that also report behavioural outcomes, which ensures that these outcomes are linked (and considering confounding factors such as other causes of morbidity or mortality). The "behaviour change" outcomes are the primary outcomes in this review, while the other outcomes are included as secondary outcomes. These outcomes were measured in quantitative research.

In addition to the "core structure" of the ToC, three types of factors that are able to influence the implementation of the promotional approaches were added to the model: (1) programme environment factors and recipient-related moderators, (2) process evaluation factors (such as recruitment, attrition, reach, dose, fidelity, adaptation, engagement, satisfaction and acceptability), and (3) recipient-related contextual factors (including socio-cultural, physical and personal contextual factors of the recipients). These factors were looked at in qualitative studies. An example of such factors are equity factors such as gender.

1.4 WHY IT IS IMPORTANT TO DO THE REVIEW

1.4.1 Key debates in current policy

As part of its 2030 Agenda, the United Nations (UN) set as Goal 6 of the 17 Sustainable Development Goals (SDGs) the ambition to "Ensure access to water and sanitation for all", including the target to "achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations." The importance of influencing behavior in order to achieve these goals is widely recognized.

In the eighties and nineties health promotion was based mainly on cognitive psychology (Aunger and Curtis, 2015). Behavior change policies in the WASH sector were predominantly influenced by different theory models such as the 'Health Belief Model' or 'Theory of planned behavior' among others (Rosenstock, 1974). When translated into policies, these theories shared a major commonality in assuming that people make rational decisions about protecting their health based on knowledge, skills and facilities. This is the era of participatory methodologies like PHAST [1] (Participatory Hygiene and Sanitation Transformation) which aimed at increasing collective understanding about health risks and promoting preventive actions. This is also the time of extensive health and/or hygiene campaigns which would aim at educating the public by raising awareness and public understanding about risk behavior.

[1] http://www.who.int/water_sanitation_health/publications/phastep/en/

With the spread of social marketing theories in the early 2000's, the 'education campaign' approach in WASH policies have shifted into new emerging approaches such as Communication for Behavioral Impact (COMBI) [2] or Change for Development (C4D) [3]. The incorporation of social marketing principles in behavior change approaches has led to the massive production of Information, Education and Communication (IEC) materials, often without considering the relevance of these materials to the desired behavioral outcome. Little attention was given on how to sustain these campaign approaches within targeted populations.

The last 10 years new developments on behavior change models were introduced, with emphasis on non-cognitive models and psychosocial theory, shaping again policies and resulting in approaches such as the current widely spread 'Community Led Total Sanitation' (CLTS) [4] or 'Behaviour Centered Design' [5]. This new vision emphasized the importance of attitudes and beliefs that influence certain behavior and social choices that shape what people think. Many variations of these approaches currently exist and it is still questionable if there is any added value of subsidies or incentives to this type of behaviour change approaches.

In summary, different behavioral theories and models have informed (and still inform) policy makers, donors and implementers about the issues to consider and the likely success of initiatives and interventions. Despite the efforts by the WASH sector in developing approaches to influence WASH behaviors, there still is no guidance on which are the most succesful techniques.

1.4.2 Overview of existing systematic reviews

In a first scoping phase (September 2015 – January 2016) an extensive overview of existing systematic reviews was performed, to answer the following research questions:

Research question 1: What is the effectiveness of approaches aiming to promote WASH behaviour change in low- and middle-income countries?

Research question 2: How do the perceptions and experiences of participants in terms of the programme's feasibility, appropriateness and meaningfulness influence WASH behaviour change?

We identified systematic reviews on the following WASH interventions : water quality (Fiebelkorn et al., 2012), hygiene hand sanitizers (Mah et al., 2008; Ejemot-Nwadiaro et al., 2015) and multiple WASH interventions (water, sanitation, hygiene) (Evans et al., 2014; Hulland et al., 2015; Joshi & Amadi, 2013). No systematic review focused on water supply or sanitation promotion programmes only.

The (multiple) WASH interventions were promoted using different approaches as follows: via social marketing principles (Mah et al., 2008; Evans et al., 2014), via community-led total sanitation (Hulland et al., 2015), via educational and/or communication channels (Ejemot-Nwadiaro et al., 2015; Hulland et al., 2015; Joshi & Amadi, 2013) or via multiple promotional

[2] http://www.who.int/ihr/publications/combi_toolkit_outbreaks/en/
[3] https://www.unicef.org/cbsc/index_42148.html
[4] http://www.communityledtotalsanitation.org/page/clts-approach
[5] http://ehg.lshtm.ac.uk/behavior-centred-design/

approaches (community mobilization, health education, motivational interviewing, role modeling, and social marketing: Fiebelkorn et al., 2012). No systematic reviews on the use of financial incentives or other approaches to promote WASH interventions were found.

There was a paucity of information on promotional approaches of interventions in the systematic reviews, which prevented us from making any further conclusions. Population heterogeneity, type of intervention and outcome measurement were some of the reasons why meta-analyses were not performed in systematic reviews.

Only one systematic review reported data on implementation factors that could influence WASH behaviour (sustained adoption) (Hulland et al., 2015). Systematic reviews concerning other factors influencing implementation were not identified. Evidence from the systematic review by Hulland et al. (2015) suggests that the most influential programme factors associated with sustained adoption include frequent, personal contact with a health promoter over a period. While the Hulland review investigated factors that affect sustained adoption of WASH technologies (e.g. promotion via frequent, personal contact), this review focuses on factors that influence the implementation of approaches to promote WASH behaviour (e.g. culture as a barrier to use a financial incentive).

More details on the methodology used in this scoping phase can be found in Appendix 2, and detailed information about the methodology, results, and conclusions will be published in a separate peer-reviewed publication.

Based on our scoping review, we concluded that in the context of our two research questions, there is still an evidence gap. For example, no systematic collection of evidence is available regarding specific promotional approaches (e.g.community-based approaches) or specific WASH components (e.g. sanitation), in relation to behaviour change as an outcome. In addition, systematic reviews lack qualitative information about factors that can influence implementation of WASH promotional approaches. Therefore, we concluded that the systematic collection, extraction and analysis of qualitative/quantitative data on the effectiveness of promotional approaches aiming to promote handwashing and sanitation behaviour change outcomes was relevant and timely.

The objective of this systematic review is to identify promotional elements and those factors in the implementation process that influence behaviour change. This study objective is answered by a mixed-methods systematic review: findings from quantitative studies that identify effective promotional approaches (quantitative arm) were enriched with insights from qualitative studies that explore factors that hinder or facilitate the implementation of these promotional approaches (qualitative arm), focusing on people's lived experiences and perceptions. The findings of this review will provide guidance to governments and international bodies in selecting promotion strategies that positively influence behaviour change.

2 Objectives

This review is a “Mixed methods research synthesis”, consisting of a strand of quantitative, and a strand of qualitative evidence. In this way, we aim not only to answer the question “what works”, but we will also inform policy makers on “why, for whom, and under which circumstances,” a programme will work.

The overall goal for this systematic review is to show which promotional approaches are effective to change handwashing and sanitation behaviour, and which implementation factors affect the success or failure of such an intervention.

This goal is achieved by answering two different review questions, in a quantitative and qualitative arm of the review:

Question 1: What is the effectiveness of different approaches for promoting handwashing and sanitation behaviour change, in communities in low- and middle-income countries?

Question 2: What factors influence the implementation of approaches to promote handwashing and sanitation behaviour change, in communities in low- and middle-income countries?

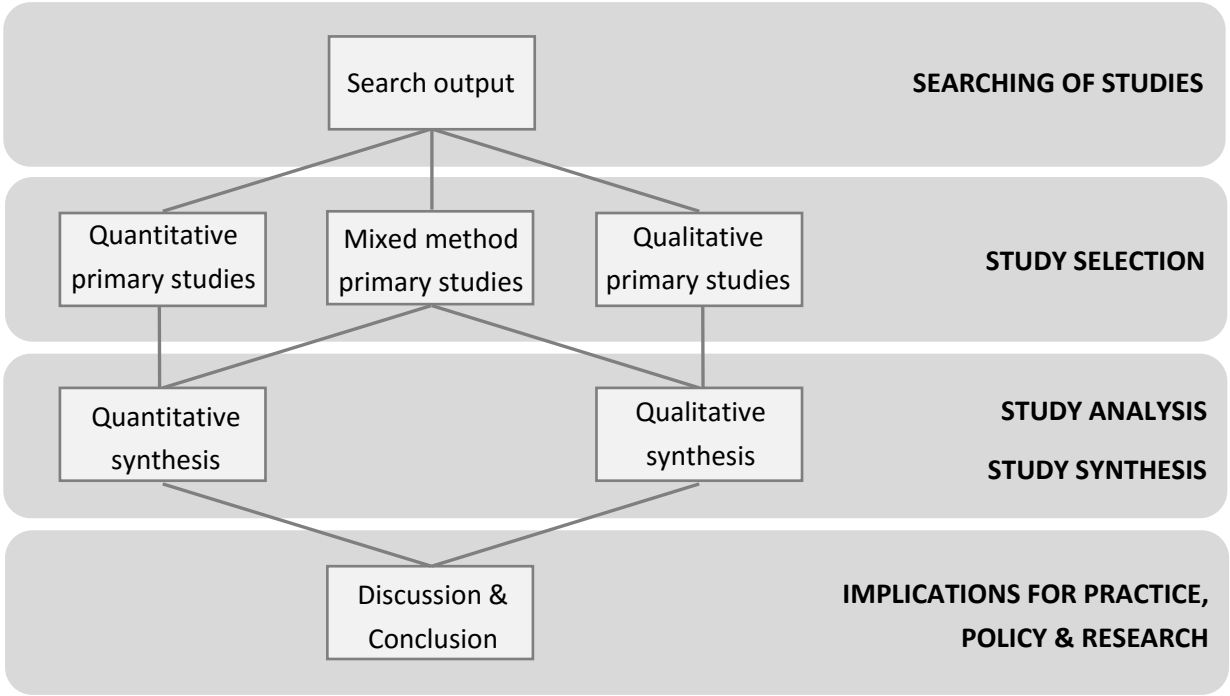
3 Methods

The protocol for this review was published in the Campbell Library on 2 May 2016 (De Buck et al. 2016). For reasons of completeness, the majority of the information in the protocol is included in the Methods section below. Deviations from the initial protocol are described in paragraph 3.5.

3.1 MIXED METHODS RESEARCH SYNTHESIS DESIGN (MMRS)

A segregated concurrent type of MMRS design was used for this review (Heyvaert et al., 2016). In this type of design, the quantitative and qualitative studies are analyzed separately (Figure 2).

Figure 2: Schematic overview of the segregated concurrent type of Mixed Methods Research Synthesis design that is used in this review



We used a comprehensive search to identify relevant literature. Quantitative and qualitative study designs were separated in the screening phase. Primary mixed method studies (i.e. studies answering both Research Question 1 and 2) were considered for inclusion when quantitative and qualitative results/findings could be separated. Design specific critical appraisal instruments were

used to assess the quality of each study type. Quantitative evidence was analysed using statistical pooling techniques (if possible). The qualitative evidence was synthesized using a "Best fit framework synthesis" approach (Booth & Carroll, 2015; Carroll, 2013).

The analysis of both strands of evidence feeds into an overall discussion and conclusion section.

3.2 CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

3.2.1 Types of studies

The type of study design is different for the quantitative and qualitative component of the review.

To answer Question 1 (effectiveness of promotional approaches), the following study types were selected:

- Impact evaluations using an experimental design (Randomised Controlled Trials (RCTs) with assignment at individual or household/community (cluster) level; Quasi-randomised controlled trials, using a quasi-random method of allocation (e.g. alternation))
- Impact evaluations using a quasi-experimental design (non-randomised controlled studies (e.g. self-selection of participants), taking into account confounding variables at the design or analysis stage)
- Observational analytic studies such as cohort studies and case-control studies.

Quasi-experimental and observational analytic studies were included since these were prevalent in the WASH literature, because randomised assignment is not always feasible or ethical.

Uncontrolled studies, case series, research methodology reports/manuscripts, editorials and economic analyses were excluded.

To answer Question 2 (implementation aspects), all qualitative study designs addressing factors influencing implementation of the promotional approaches were considered for inclusion. This includes for example grounded theory, case studies, phenomenological studies, ethnographic research, action research and thematic approaches to qualitative data analysis. The following types of studies were excluded: studies that did not use formal qualitative research study designs (e.g. surveys) or data collection techniques (e.g. interviews, focus group discussions, observations), and purely descriptive studies such as editorials and opinion pieces.

3.2.2 Types of participants

Participants included both children and adults from low- and middle-income countries (LMIC), as defined by the World Bank, at the time the intervention was conducted. Studies performed at an individual, household, school or community level were included, whereas studies conducted in institutional settings (e.g. hospitals) were excluded.

3.2.3 Types of interventions

Programmes conducted to promote uptake and use of handwashing, and the following sanitation interventions were included: latrine/toilet use, safe faeces disposal practices, and discouraging the practice of open defecation. Any combination of the interventions listed above were included. The following programmes were excluded: programmes conducted to promote water treatment, water supply for drinking only, menstrual hygiene, food hygiene, animal waste disposal, facial cleansing. Any combination of the interventions listed above with water treatment, drinking water supply or other hygiene interventions were included if individual outcomes, as listed below, were present.

The programme contained a direct promotional approach related to one of the following categories: community-based approaches, social marketing approaches, sanitation and hygiene messaging, elements of psychosocial theory, incentives, advocacy, or any combination of the promotional approaches or promotional elements mentioned above (multichannel approach) (details on these approaches can be found in paragraph 1.2.1).

Programmes using no promotional approaches were excluded.

3.2.4 Comparison

For Question 1 (effectiveness of promotional approaches), the comparison is the use of a programme with other forms of behaviour change promotional approach, or no promotional programme.

3.2.5 Types of outcome/evaluation measures

To answer Question 1 (effectiveness of promotional approaches), studies reporting the following outcomes were selected:

Primary outcomes

The primary outcome is behaviour change, operationalized in the following way: (a) use of handwashing and sanitation interventions (*handwashing*: handwashing with or without soap (or alternatives such as ash) and/or hand disinfection with alcohol based gels, handwashing at key times (before eating, before food preparation, after visiting the toilet, after children's faeces disposal or cleaning the baby's bottom, or other key times used in the studies); *sanitation*: latrine/toilet use, safe faeces disposal, number of people practicing open defecation): *uptake* of the interventions, *adherence* to the interventions, *longer-term use* of the interventions, (b) intention to practice handwashing and sanitation interventions (readiness, willingness), (c) habit to practice handwashing and sanitation interventions (routinized behaviour, adherence, longer-term use). Other indirect outcomes, such as "presence of soap" were not considered. Outcomes concerning animal faeces were not included if it was explicitly mentioned that faeces were from animals. Outcomes that could not be categorised under one of the outcome measures listed above were not included (e.g. cleaning of child after defecation).

Secondary outcomes

The secondary outcomes are: behavioural factors (knowledge, skills, attitude, norms, and self-regulation concerning the practice of handwashing and sanitation interventions); morbidity and mortality due to agents associated with faecal-oral transmission. Indirect outcomes, such as "pupil absence", were not considered. Symptom-based health outcomes, such as cough, general illness, fever and congestions were not included. Studies reporting data on morbidity and mortality were only included if data on primary outcomes (behaviour change) were also available. Studies reporting only behavioural factors, and no primary outcomes, were included.

We included outcomes that were measured via direct observation/demonstration (where a participant is asked to show how a behaviour is practiced), as well as self-reported, parent-reported or teacher-reported outcomes.

To answer the Question 2 (implementation aspects), perceptions, experiences, opinions, or viewpoints of implementers or recipients of the programme concerning factors influencing implementation were extracted. These factors included for example public commitment, motivation, culture, gender, social capital, etc. From an analytical point of view, we focused on aspects of feasibility, appropriateness and meaningfulness of the promotional approach as experienced by the people involved in the implementation of the promotional programmes.

3.2.6 Duration of follow-up

No restrictions in timing of outcome measurement were used. Outcomes measured during the implementation of the programme were categorised as "uptake", outcomes measured within 12 months after the programme implementation were categorised as "adherence", and outcomes measured >12 months after the end of the programme implementation were categorised as "longer-term" outcomes.

3.2.7 Language

No language restrictions were used.

3.2.8 Publication date

Studies from 1980 to March 2016 were included. This date is based on the introduction of the Millennium Development Goals in 1990 (MDG7: "To ensure access to drinking water and sanitation for all"), which was followed by the development of evidence-based interventions for hygiene promotion (DFID, 2013). We also checked the publication dates of the included studies in the identified systematic reviews (scoping phase), but since one study was published in 1985, we chose 1980 as cut-off date (Stanton & Clemens, 1985).

3.3 SEARCH METHODS FOR IDENTIFICATION OF STUDIES

Searching for studies was done according to the principles stated by Hammerstrøm et al. (2010). One search strategy per database was developed to search for quantitative and qualitative studies.

3.3.1 Electronic databases

We searched the following databases from 1980 to March 2016:

- 3ie Impact Evaluation Database
- Applied Social Sciences Index and Abstracts (ASSIA, ProQuest)
- Cochrane CENTRAL issue 2 of 12, February 2016
- EMBASE (OVID)
- ERIC (EBSCOHost)
- Global Health (CABI)
- Global Index Medicus
- International bibliography of the Social Sciences (IBSS, ProQuest)
- MEDLINE (PubMed)
- PsycINFO (EBSCOHost)
- Social Sciences Citation Index (SSCI, Web of Science)
- Sociological Abstracts (ProQuest)

A sensitive search strategy based on existing search strategies from existing WASH systematic reviews, our ToC and our selection criteria, was developed by an information specialist and tested in an iterative way for each database separately. A combination of index terms (where relevant) and free text words (in title/abstract) was used, with attention to possible synonyms and words used in key papers. De-duplication of the references was done by the information specialist using Reference Manager 12. All searches, search dates, and number of references found per database are documented in Appendix 3 (search strategies) and 4 (search report).

3.3.2 Searching other resources (grey literature)

To find unpublished material and relevant programme documents, we contacted the following research groups and organizations and/or checked the following websites (March 2016):

- CLTS Foundation (www.cltsfoundation.org)
- Development Media International (DMI) (http://www.developmentmedia.net/)
- ELDIS.org (http://www.eldis.org/)
- Government of India website (https://India.gov.in)
- iDE Global WASH Initiative (http://www.ideorg.org/WhatWeDo/WASH.aspx)
- International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) (http://www.icddrb.org/)
- International Water Centre – Australia (www.watercentre.org/)
- IRC International Water and Sanitation Centre (http://www.irc.nl/)
- Oxfam International (https://www.oxfam.org/en/tags/water-and-sanitation)
- R4D (Research for Development) UK DFID http://r4d.dfid.gov.uk/Default.aspx
- SHARE (Sanitation and Hygiene Applied Research for Equity) consortium (www.SHAREresearch.org#sthash.DsqhxgDC.dpuf)
- Social Science Research Network Electronic Library
- Susana project database (http://www.susana.org/en/resources/projects)
- United Nations Children's Fund (UNICEF) (http://www.unicef.org.uk/)

- Water and Sanitation for the Urban Poor (WSUP) (http://www.wsup.com/)
- Water, Engineering and Development Centre, UK (www.lboro.ac.uk/wedc/)
- WaterAid (www.wateraid.org/)
- WaterSHED (http://www.watershedasia.org/)
- WHO:
    - Department of Child and Adolescent Health and Development (WHO) http://www.who.int/maternal_child_adolescent/en/)
    - Water, Sanitation and Health Program (WHO) (http://www.who.int/water_sanitation_health/en/)
    - World Health Organization (WHO) (http://www.who.int/en/)
- World Bank:
    - JOLIS (http://external.worldbankimflib.org/uhtbin/webcat/)
    - World Bank (http://www.worldbank.org/)
    - World Bank Water and Sanitation Program (http://water.worldbank.org/related-topics/water-and-sanitation-program, http://water.worldbank.org/shw-resource-guide/promotion/hygiene-promotion-approaches)

This list of sources was based on the advice and network of our team members and Advisory Group members.

Content experts (including the Advisory Group) were consulted for missing studies.

3.4 DATA COLLECTION AND ANALYSIS

Statistical support was provided by the statistician who is part of the review team.

3.4.1 Selection of studies

Study selection was performed independently and in parallel by two evidence reviewers, using EPPI-Reviewer software. In the first phase, titles and abstracts of the references identified during the search were scanned. Full text versions of relevant articles were retrieved, and references that met the selection criteria were included for further analysis. The references resulting from grey literature sources were screened, based on title and abstract, by only one reviewer. Full text assessment of the grey literature was done by 2 reviewers. Any discrepancies between the two reviewers were resolved by consensus, and in case of disagreement, a third reviewer was involved. A PRISMA study selection flowchart was developed (Moher et al., 2009), and a list of excluded studies with the reasons for exclusion was provided. References were labelled as “unavailable”, when it was not obtainable through the libraries of the institutions involved (Stellenbosch University (South Africa), KU Leuven (Belgium)).

3.4.2 Data extraction and management

Data extraction (including quality assessment) was performed by two reviewers independently.

Question 1 (effectiveness of promotional approaches):

Data concerning publication date, study design, study population, details of the intervention, outcome type, and study quality were independently extracted by the two reviewers.

For the intervention, information on the targeted activity (handwashing, sanitation) as well as information on the promotional approach, was extracted. For the promotional approach we extracted the following data: (1) who is providing the approach, (2) who is receiving the approach, (3) the exact content of the promotional approach (presence of promotional elements such as sanitation and hygiene messaging, psychosocial theories, community-based participatory approach, social marketing, incentives, advocacy, and other elements such as pride/disgust/behaviour change techniques), and (4) process evaluation factors (recruitment, attrition, reach, dose, fidelity, adaptation, engagement, satisfaction, acceptability). All these different elements were extracted separately. Study authors of all included papers were contacted by email (in July 2016) to ask for any relevant information, related to the population, intervention or outcomes, that was missing or not reported in the paper. A reminder to authors was sent in August 2016. All relevant information received by the latest, on 19th of September, was screened and included in the code book.

Outcomes measured at different time points following the intervention were extracted separately.

For each dichotomous outcome, we either extracted the number of participants experiencing the event, and the number of participants in each treatment group, or the information necessary to estimate odds and risk ratios, including group means and sample sizes. For each continuous outcome that can be assumed to be normally distributed, we extracted means, standard deviations (or information to estimate standard deviations), and number of participants in each group. For skewed continuous data, medians, ranges, and p-values for non-parametric tests were extracted.

Any discrepancies between the two data extractors were resolved through discussion, or by consulting other review co-authors. If studies used different conventions/scales, the direction of interpretation is explained and it is clearly indicated when directions were reversed. Data were entered into meta-analysis software, and checked for accuracy.

A table was developed with the characteristics of the included studies, containing a summary of the characteristics of the participants, interventions, outcomes and other relevant information. In addition, a visual overview of the findings was created, in addition to the forest plots with pooled and unpooled findings.

Question 2 (implementation aspects):

For Question 2, data concerning publication date, study design, study population, details of the intervention, and evaluation measures were extracted by one reviewer, and double checked by the second reviewer. A third reviewer resolved any disagreements. Similar information on the intervention was extracted as described for Question 1. Implementation factors (such as programme environment factors, recipient-related factors, and socio-cultural, physical and personal contextual factors) of our ToC were used as a-priori themes. Subsequently, inductive

coding on both the original statements of the interviewees (defined as PE ("primary evidence")) and the author statements (defined as AS ("author statements")) was performed. Both data extraction and inductive coding was double checked by the second reviewer.

Use of codebook for data extraction:

Quantitative as well as qualitative data were extracted using a codebook developed for this purpose (see Appendices 5 and 6). The codebook is based on the elements of the ToC. All items of the codebook were incorporated in EPPI-Reviewer software, so that data extraction could be performed easily in parallel by two reviewers.

In the codebook, variables were theoretically and operationally defined if this was necessary to guarantee intercoder and intracoder agreement during the data extraction process.

3.4.3 Quality assessment of included studies and determination of certainty of evidence

Question 1 (effectiveness of promotional approaches):

Risk of bias in the individual studies (experimental studies) was analysed at the study level by using the Cochrane Risk of Bias tool (Higgins and Green, 2011). For quasi-experimental studies, a combination of the risk of bias tool provided by 3ie and the Cochrane tool for non-randomised studies (ACROBAT-NRSI), was used (see Appendix 7). The different choices made during the risk of bias assessment were justified by providing information directly from the study. A specific question was added to the risk of bias assessment concerning the rigour of the outcome measurement, especially for handwashing, since it is known that over-reporting often takes place when using questionnaires (Manun'Ebo et al., 1997; Contzen et al., 2015).

The GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach was used to assess the overall quality/certainty of the evidence included in this review. This approach is based on the limitations in study design, imprecision, inconsistency, indirectness, and publication bias (Atkins et al., 2004). As part of the GRADE process (Atkins et al., 2004), for each type of promotional approach, the certainty of evidence for the "body of evidence" was assigned per outcome category. The final certainty of evidence ranged from high (i.e. further research is very unlikely to change our confidence in the estimate of effect), moderate (i.e. further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate), low (i.e. further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate) to very low (i.e. we are very uncertain about the estimate). Because of a very large number of data and analyses, it was decided not to determine the certainty of evidence in the following cases: (1) when statistical heterogeneity > 50%, (2) individual outcomes, and (3) secondary outcomes. The online tool of the GRADE Working Group ("GDT" or "Guideline Development Tool") was used for the GRADE assessment process. Standardised qualitative statements were used to link the findings to their corresponding level/certainty of evidence in the description of the meta-analyses (Section 4.3.1.1) and the "Summary of main results" (Section 6.1): use of the wording "probably" with moderate certainty

evidence, use of wording “may” with low certainty evidence, and a statement about being uncertain about the effect of the intervention on the outcome for very low certainty evidence (EPOC 2015).

Question 2 (implementation aspects):

A quality appraisal was done at the study level by using the CASP Qualitative Checklist to reveal limitations in study design (Critical Appraisal Skills Program 2014), as a baseline measure of quality of the included studies (see Appendix 8). We did not exclude any studies from our review. Instead, we conducted a sensitivity analysis exploring the impact of including low quality studies in the review on the overall findings.

3.4.4 Measures of treatment effect

Binary outcomes were used to calculate risk ratios (RR) (+ 95% confidence intervals (CI)). For continuous data, (weighted) mean differences (MD) (+ 95% CI) were calculated. We only used the (unadjusted/adjusted) effect measures calculated by the study authors in case the binary/continuous data were not available. If outcome measures were opposite to the intervention categories we defined (e.g. “no latrine use” instead of “latrine use”), binary data were reversed. This was indicated on the forest plots with an asterisk. Unit of analysis issues were carefully considered in order to adjust for the clustering effect (in case of cluster RCTs) and/or for multiple testing (in case of multi-arm trials). For cluster RCTs a cluster adjustment on the raw data (binary/continuous outcomes) was made. For the binary outcomes, the raw data (e.g. number of handwashing at key times events) were divided by the calculated design effect. For the continuous outcomes, the raw data (e.g. mean number of people washing their hands at key times) was multiplied by square root of the calculated design effect. The design effect was calculated by the formula: design effect = 1 + ((average cluster size -1) x ICC (intra-cluster correlation coefficient)), as detailed in the Cochrane Handbook of Systematic Reviews Chapter 16.3 (Higgins and Green, 2011). We used the ICC as reported by the original study. In cases where the ICC was not reported, we estimated the ICCs using the following strategy: within each category of promotional approaches we used the mean of the ICCs of studies for which an ICC was reported; in two categories of promotional approaches (i.e. sanitation and hygiene messaging and social marketing approach) none of the studies had reported ICCs, in which case the most conservative ICC value of the other categories was used. We calculated synthetic effects for any instances of dependent effects (e.g. shared control groups in multi-arm trials), according to the method described in the Cochrane handbook chapter 16.5.4 (Higgins and Green, 2011): for dichotomous outcomes both the sample sizes and the numbers of people with events were summed across groups.

3.4.5 Data synthesis

Evidence relating to Question 1 (effectiveness of promotional approaches) was synthesized in a quantitative way (meta-analysis), where possible. Meta-analyses were performed for 13 different outcomes across promotional approaches and timing of measurement of outcomes, to be able to make conclusions about the effect of “any promotional approach versus no promotional approach”. As soon as an outcome was present more than once, but within the same study type, it was included in a meta-analysis. Meta-analyses were conducted using Stata version 14 software. Meta-analysis results are displayed using forest plots. We used random-effects meta-analysis to produce

an overall summary, if an average treatment effect across trials was considered meaningful. Fixed effect meta-analysis was not applied because its homogeneity assumption was not applicable in this systematic review. Included experimental studies were categorised and analysed according to the different promotional approaches. Experimental and quasi-experimental/ observational studies were analysed separately. Mantel-Haenszel (M-H) methods were used for binary outcomes in the random-effects meta-analysis, and for calculating the effect measures, and the Inverse-Variance (I-V) method was used for continuous outcomes. Effect measures of binary outcomes were expressed as RRs (as described in 3.4.4), however a sensitivity analysis using risk differences (RD) was also made and tabulated. Forest plots reporting RDs are available upon request.

Where meta-analysis was not possible, we reported results from individual studies separately. The data were grouped in separate forest plots according to the promotional approach and outcome. Data were included in forest plots if possible, or reported narratively otherwise. Evidence conclusions were formulated in a narrative way, but mentioning where possible the effect sizes (and CI), and considering risk of bias. Where possible, differences in results are explained by describing likely explanatory factors. A statistically non-significant p-value was interpreted as a finding of uncertainty ("no evidence of effect") unless confidence intervals were sufficiently narrow (no imprecision according to the GRADE approach) to rule out an important magnitude of effect ("evidence of no effect"). Accuracy of numeric data in the review were checked against the data as available from the original study.

3.4.6 Assessment of statistical heterogeneity

The measures I^2 and τ^2 were used as a measure of presence of heterogeneity, which was then further explored. An I^2 value of greater than 50% was considered as a substantial measure of heterogeneity.

3.4.7 Subgroup analysis

Subgroup analyses were performed according to the type of promotional approach (community-based approaches, social marketing approaches, sanitation and hygiene messaging, psychosocial theory). Because of an insufficient number of studies per meta-analysis, no other subgroup analyses were made. The following factors were used in a descriptive way as likely explanatory factors for differences in results: (1) different types of *promotional approaches,* (2) the *targets* of the study (individual, household, community), (3) the *setting* where the approach has been applied (rural, urban, informal-urban; see Peal et al., 2010) (Fiebelkorn et al. (2012) reported differential behaviour change near the city and among the rural population; see also DFID, 2013), (4) the *scale* at which the approach has been applied (small scale (one village, several villages) vs larger scale (sub-district, district, province or region, national); see Hulland et al., 2015), and (5) other *equity factors* such as socioeconomic status, occupation and education (O'Neill et al., 2014) (adherence to water, sanitation and hygiene programmes is known to be highly associated with these confounding factors; see DFID, 2013).

3.4.8 Sensitivity analysis

No sensitivity analyses were performed due to insufficient number of studies per meta-analysis, however the risk of bias of the individual studies was considered when interpreting results.

3.4.9 Synthesis of qualitative research

For the qualitative evidence synthesis, we used the "Best fit framework synthesis" approach (Booth, 2015; Carroll, 2013).

The first step of this approach was to identify an existing model for a particular health behaviour, in this case "WASH behaviour". In the scoping phase of this project existing models for WASH behaviour change were identified, including the RANAS model and IBM-WASH model (Mosler, 2012; Dreibelbis et al., 2013). These models, that were included in our ToC, were used as an "*a priori* framework". In addition to the information from the WASH behaviour change models, elements from the "Checklist for implementation" (Cargo et al., 2015), the SURE framework for implementation of a policy option (The SURE Collaboration 2011), and the PROGRESS framework to consider equity issues (O'Neill et al., 2014), were used to inform the *a priori* framework.

In the second step of this approach, we coded data from individual qualitative studies against the a priori themes of our ToC model, representing factors that can influence the implementation of the promotional approaches ToC model (i.e. programme environment factors and recipient-related moderators, process evaluation factors and recipient-related contextual factors). Inductive, thematic analysis techniques were used if data could not be accommodated within these themes.

Information from the critical appraisal items (CASP tool) was not used a-priori to exclude low-quality or high-quality studies. A sensitivity analysis was conducted by excluding low-quality studies and to test the impact of these exclusions on the overall synthesis of findings (Carroll et al., 2012).

The conclusions of both strands of evidence were integrated at the end of the review process in the conclusion and discussion section. In addition, the conclusions were coupled back to the ToC. Conclusions were based only on findings from the synthesis (quantitative or narrative) of studies included in the review.

In the discussion section of the review, policy implications of the findings are discussed, taking into account local considerations. In addition to the policy messages, implications for research are formulated.

3.5 DEVIATIONS FROM THE PROTOCOL

In the protocol, it was stated that for study selection we would use the text mining features of EPPI-Reviewer. However, since this feature was not ready to use at the time of study selection, this was removed from the Methods section.

In the phase of study identification, we were not able to obtain the full text for some relevant references. We added to the Methods section that we labeled such papers as “unavailable” if both university libraries involved were not able to retrieve the full text articles.

During the phase of data extraction, we further operationalized the definitions for the promotional approaches “sanitation and hygiene messaging”, “elements of psychosocial theory” and “community-based approach”, and for the outcomes “uptake”, “adherence” and “longer-term use”. We added to the Methods section that a promotional programme would be categorised as “community-based” when one of the above-mentioned community-based programmes is reported or where it is clearly indicated that “community members should be invited to share decision-making authority with all other persons involved”. For “uptake” we defined that this should take place during the implementation of the programme. For “adherence” we defined that this outcome should take place until 12 months after the end of the programme’s implementation, while “longer-term use” takes place at least 12 months following the project period. We added to the Methods section that we classified the promotional approaches/promotional elements in 4 main groups, based on the major component of each approach: community-based, social marketing, sanitation and hygiene messaging, or elements of psychosocial theory.

Concerning the primary outcomes, it was clarified that outcomes concerning animal faeces were not included; if the type of faeces was not mentioned, the outcome was included. The outcome “safe disposal of child faeces”, as mentioned in the protocol earlier, was changed into “safe faeces disposal”, to be more inclusive. For “handwashing at key times” we added “other key times” to the methods section, as compared to the protocol, to allow other key times measured in the studies.

In the protocol, it was mentioned that no further data extraction would be carried out if a substantial amount of information concerning the promotional approach was missing. We now removed this from the Methods section, since there was no study for which data extraction was not carried out. In addition, it was mentioned that when information on the content of the programme was missing, related programme reports would be checked; this was removed from the Methods section since we did not encounter this situation.

Because of heterogeneity across the studies for several aspects (interventions, having a WASH component and promotional approach component; outcome measures; timing of measurement of outcomes; method of outcome assessment), it was difficult to perform meta-analyses, and meta-analyses were only performed to a limited extent. In addition, since only a limited number of studies was included in each meta-analysis, subgroup analyses for several factors, adjusting for missing data and the assessment of publication bias were not made as originally planned. In the methods section we now specified how we determined ICC values for cluster RCTs and how these were used to calculate the design effect and to adjust for clustering. It was also decided *post hoc* to

express effect measures based on binary data as RRs (risk ratios), as well as RDs (risk differences) to show absolute effects.

In the protocol, it was mentioned that the certainty of evidence for the "body of evidence" resulting from the quantitative studies would be assigned according to the GRADE approach. We now added to the Methods section that this happened for each type of promotional approach, and each type of outcome. It was also included in the protocol that we would use the CerQual approach to assess the overall confidence in the qualitative evidence synthesis. Since almost all codes that were identified were based on a single study, it was decided not to make the CerQual assessment. The quality assessment using the CASP checklist was performed for each qualitative study.

The research team used the first 6 months of the project (September 2015-February 2016) to perform the overview of reviews, to develop the ToC and to organize a stakeholders meeting to discuss these results and to fine-tune our initial protocol. Therefore, due to the restricted time available from March 2016 onwards, we needed to deviate from the initial protocol for the following steps:

1. We did not search citation and reference lists of included studies and we did not check retraction statements and errata. In addition, the "Related Articles" feature of the databases was not used. As a backup for identification of missing studies we consulted our Advisory Group and a bigger group of stakeholders (including practitioners, policy makers, funders, and content experts). In addition, references from grey literature sources were only screened by one reviewer based on title and abstract. Full text assessment of the grey literature was done by 2 reviewers.
2. In the initial protocol, a broader set of primary sanitation outcomes (including more indirect behaviour change outcomes such as latrine construction, latrine hygiene, buying of latrines, latrine maintenance) were included compared to the primary handwashing outcomes (only direct outcomes: handwashing (at key times) with or without soap). In order to be consistent and due to the availability of direct primary sanitation outcomes (i.e. open defecation practices, latrine use or safe faeces disposal practices), we decided to exclude the indirect sanitation outcomes. Concerning health outcomes, we excluded symptom-based outcomes such as cough, general illness, fever and congestion. Since it was not mentioned in the protocol if indirect outcomes would be included, we now added to the Methods section that indirect outcomes such as "presence of soap" and "pupil absence" were not considered. In addition, we added to the Methods section that outcomes that could not clearly be categorised under one of the outcome measures listed were excluded.
3. We now mention in the Methods section for which outcomes the certainty of evidence was determined according the GRADE approach. We decided not to determine levels of evidence for secondary outcomes, for individual outcomes and for pooled outcomes with heterogeneity > 50%.
4. For the data extraction of the qualitative studies it was indicated in the protocol that this would be done by 2 reviewers in parallel. However, initial data extraction was only done by one reviewer, and a double check of the extracted data was performed by the second reviewer.

5. A pilot trial of the codebook was not performed beforehand, however, changes were made iteratively during the process. For the quantitative studies, the following codes, related to the quality appraisal of quasi-experimental/observational study designs, were developed *post hoc*: bias in selection of participants into the study (4 questions + risk of bias judgement), bias due to confounding (3 questions + risk of bias judgement), bias in measurement of interventions (3 questions + risk of bias judgement), bias in measurement of outcomes (3 questions + risk of bias judgement), bias due to departures from intended interventions (3 questions + risk of bias judgement) and reporting bias (2 questions). For the qualitative studies, it was part of the process of data extraction that additional themes were added to the ones that were already identified in the ToC model.

4 Results: Effectiveness of different approaches

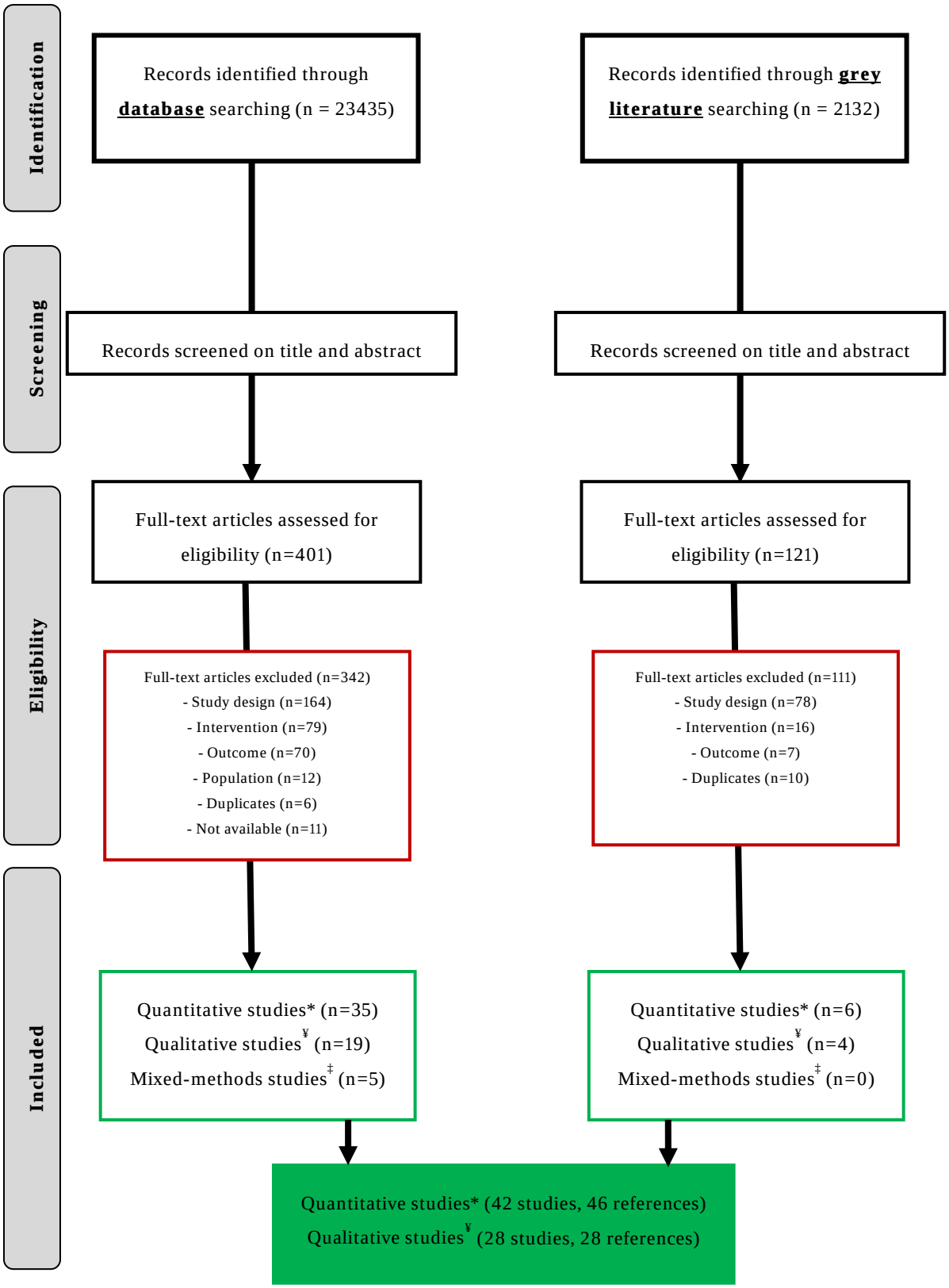
4.1 DESCRIPTION OF STUDIES

4.1.1 Results of the search

We identified 23,435 records through database searching. In addition, 2,132 references were identified through grey literature searching. Following title and abstract screening, 522 records were selected for full text screening, including 401 references from database searching and 121 records via screening of the grey literature. The full texts of these references were read in detail, and after applying the pre-specified selection criteria, 342 database papers and 111 grey literature reports were excluded. This finally resulted in 35 quantitative, 19 qualitative and 5 mixed-methods studies from databases, and 6 quantitative and 4 qualitative studies from grey literature. A mixed-methods study was defined as a study fulfilling the criteria of our first and second research question.

Taken together, we identified 46 references to quantitative studies (individual quantitative and mixed-methods studies), and 28 references to qualitative studies (individual qualitative and mixed-methods studies). For the quantitative papers published by Contzen et al. (2015a and 2015b), Galiani et al. (2012 and 2015), Hoque et al. (1994 and 1996) and Patil et al. (2013 and 2015), two separate references (with complementary information) for each study were included resulting in a total number of 41 quantitative studies (from 45 references). The study selection flowchart can be found in Figure 3.

Figure 3: Study selection flowchart



*Defined as primary quantitative/mixed-methods studies fulfilling the selection criteria of the first research question (effectiveness).
¥Defined as primary qualitative/mixed-methods studies fulfilling the selection criteria of the second research question (implementation).
‡Defined as primary quantitative/qualitative studies fulfilling the selection criteria of the first and second research question (effectiveness + implementation).

4.1.2 Included quantitative studies (n=42)

An overview of the characteristics of the included quantitative studies can be found in Table 1. The majority of the studies was published in the last 10 years, with only 5 studies published between 1987 and 2006.

- Study type

We included 32 experimental studies, which are studies using random allocation methods. Among the 32 experimental studies are 26 RCTs, of which 22 are cluster RCTs, and 6 quasi-RCTs, the latter being prospective studies using a quasi-random method of allocation (e.g. alternation). In addition to the 32 experimental studies we included 8 quasi-experimental studies (non-randomised controlled trials), which by definition use non-random allocation methods (e.g. self-selection of participants) alongside statistical analysis to address confounding. Finally we also included 2 observational studies (i.e. cohort studies).

- Countries (see Figure 4)

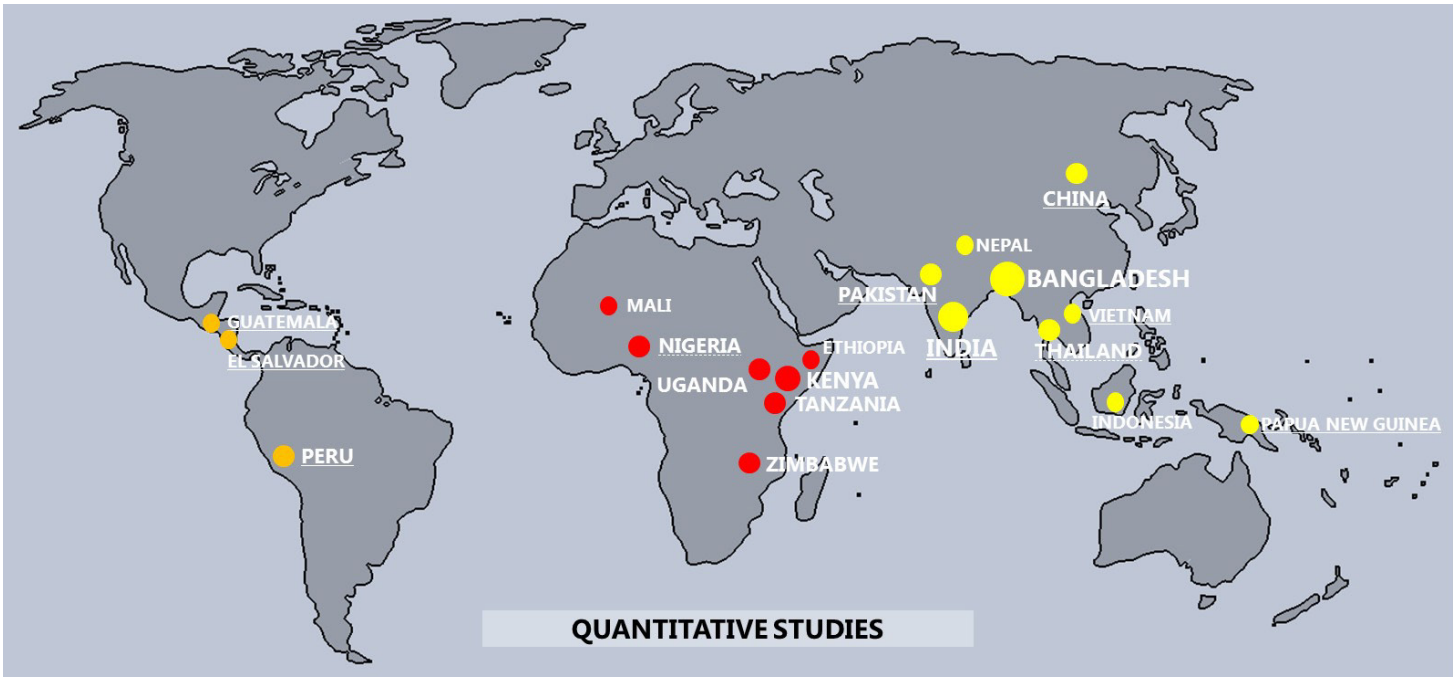
Most of the studies (n=25, 59%) were performed in Asia: 17 studies in South Asia (Bangladesh (n=8), India (n=7), Pakistan (n=2) and Nepal (n=1)), 5 in South-East Asia and Oceania (Thailand (n=2), Indonesia (n=1), Papua New Guinea (n=1), Vietnam (n=1) and 2 in East Asia (China (n=2)). Thirteen studies were performed in Sub-Saharan Africa (Kenya (n=3), Zimbabwe (n=2), Uganda (n=2), Tanzania (n=2), Nigeria (n=2), Ethiopia (n=1) and Mali (n=1)), and only 4 in Central America (Guatemala (n=1) and El Salvador (n=1)) or Latin America (Peru (n=2)).

Considering country income at the time the studies were performed, 22 studies (52%) were conducted in low-income countries (Bangladesh, Ethiopia, Kenya, Mali, Nepal, Nigeria (until 2007), Tanzania, Thailand, Uganda and Zimbabwe), 18 studies (43%) in lower middle-income countries (China (until 2010), El Salvador, Guatemala, India, Nigeria (from 2007), Pakistan, Papua New Guinea, Peru (until 2008), Thailand and Vietnam) and 2 (5%) in upper middle-income countries (China (from 2010) and Peru (from 2008)).

- Setting and target level

Most (69%) of the studies were executed in a rural setting (n=29), 6 studies (14%) were performed in an urban setting, and 4 studies (10%) were performed in an informal-rural setting (i.e. slums, settlements). Three studies (7%) had no information about the setting in which the studies were conducted. The intervention was targeted at a a household level in 14 studies, a village level in 6 studies, a household/village level in 2 studies, a community level in 5 studies, a household/community level in 1 study, an individual level in 2 studies, a neighborhood level in 1 study, on a compound level in 2 studies and at a school level in 8 studies. One study investigated interventions on both a community level and a school level.

Figure 4: World map indicating in which countries the included quantitative studies were performed



Adapted from © 2009 www.outline-world-map.com
Underlined countries, full line: country was a middle income country when the study was performed.
Underlined countries, dotted line: country was a low or middle income country when the study was performed.
Magnitude of circles increases with number of studies performed in that country.
Orange: Central America and Latin America; Red: Sub-Saharan Africa; Yellow: South Asia, South-East Asia and Oceania.

- WASH intervention

Thirty-three studies compared one WASH intervention to either no intervention (n=23), or another intervention (n=10). The intervention programmes comprised different combinations of WASH components: sanitation only (n=5), handwashing only (n=10), handwashing+sanitation (n=3), handwashing or sanitation with other WASH components (other hygiene (n=3), water supply (n=4), other hygiene+water supply (n=1), water quality (n=1)), and general WASH (n=6).

Six studies compared two WASH interventions to no intervention. The WASH components of the two intervention groups were: sanitation+handwashing versus handwashing (n=1), handwashing+water supply versus handwashing (n=1), sanitation versus sanitation+other hygiene (n=1) and handwashing in both intervention groups (but different promotional approaches used) (n=3).

Two studies compared three WASH interventions to no intervention (n=1) or another intervention with general WASH components (n=1). The WASH components of the 3 intervention groups were: sanitation versus handwashing versus sanitation+handwashing (n=1), and handwashing only in the 3 intervention groups (but different promotional approaches used) (n=1).

One study compared four WASH interventions to no intervention. The WASH component of the four intervention groups was sanitation (but different promotional approaches used).

- Promotional approach

The promotional approaches differed considerably across the studies. For each study, we indicated if elements of sanitation and hygiene messaging, psychosocial theory, community-based working, social marketing, incentives or advocacy were used, leading to 27 different combinations of elements and thus 27 different promotional approaches (see Figure 5). Based on the main promotional element in each approach we classified the promotional approaches/promotional elements in 4 groups. This was done independently by 4 team members (methodological and content experts), followed by discussion to resolve disagreements. In addition, we also discussed this with a large group of stakeholders who agreed with the classification approach.

Based on the major component of the promotional approach used in each study, we distinguished these 4 major approaches:

1. Community-based approaches: in this category we included the studies that used a formal community-based approach or those approaches that contained elements of community-based working as the major strategy. Other elements that could be part of these approaches were: education, incentives, and/or theory-based elements.
2. Social marketing approaches: all studies that used a formal social marketing approach or where marketing was the main element of the promotional approach were grouped in this category; other elements that could be part of these approaches were: community-based aspects, incentives, advocacy, and/or theory-based elements.
3. Sanitation and hygiene messaging: since educational elements were present in almost all promotional approaches we only included those approaches that used a directive way of education, making use of one-way communication; other elements that were part of the approach were incentives, public commitment, and/or theory-based elements.
4. Elements of psychosocial theory: in this category we included those approaches that used psychosocial theory, social cognitive elements or theoretical elements of behaviour change to design the intervention and as the main focus of the approach. Interventions designed this way were typically small-scale and used formative research.

According to these criteria we classified the promotional approach as a community-based approach in 13 studies, a social marketing approach in 7 studies, and sanitation and hygiene messaging in 15 studies. Elements of psychosocial theory were investigated in 6 studies. Table 2 gives an overview of which studies were grouped under each category.

Table 2: List of included quantitative studies in each of the 4 categories of promotional approaches

Promotional approach versus no promotional approach			
Community-based approach	Social marketing approach	Sanitation and hygiene messaging	Elements of psychosocial theory
Andrade, 2013	Arnold et al., 2009	Abiola et al., 2012	Biran et al., 2014
Guiteras et al. (2015b)	Biran et al., 2009	Bowen et al., 2013	Chase & Do (2012)
Hoque et al., 1994/1996	Briceno et al., 2015	Caruso et al., 2014	Contzen et al. (2015a + 2015b)
Huda et al., 2012	Cameron et al., 2013	Graves et al. (2011)	Langford & Panter-Brick, 2013
Jinadu et al., 2007	Dickey et al. (2015)	Guiteras et al. (2015a)	Lhakhang et al. (2015)
Kochurani et al., 2009	Galiani et al., 2012/2015	Kaewchana et al., 2012	Luby et al., 2010
Patil et al., 2013/2015	Pinfold, 1999	Lansdown et al., 2002	Tumwebaze & Mosler, 2015
Pattanayak et al., 2009		Luby et al., 2009	
Phuanukoonnon et al., 2013		Mascie-Taylor et al., 2003	
Pickering et al., 2015		Pickering et al., 2013	
Waterkeyn & Cairncross, 2005		Seimetz et al., 2016	
Whaley & Webster (2011)		Stanton & Clemens, 1987	
Younes et al., 2015		Wang et al., 2013	
		Yeager et al., 2002	
		Zhang et al. (2013)	

Figure 6 also lists the specific approach in each study and the WASH component for each study. Community-based approaches all contained at least a sanitation component (except for one study with a handwashing-only intervention), social marketing approaches and sanitation and hygiene messaging interventions focused in the majority of the cases at least on handwashing, and the approaches based on elements of psychosocial theory almost in all cases only had a handwashing component.

Seven studies only looked at the relative effectiveness of a promotional approach versus another promotional approach and 1 study compared programmes with a similar promotional approach (i.e. sanitation and hygiene messaging) but with different communication channels (interpersonal+mass media communication versus mass media only).

Since (non-)financial incentives were always part of a broader promotional approach listed above, we did not create a separate category for this type of promotional elements. However, in Table 3 an overview of the types of incentives is provided, and in the results section below, incentives are dealt with as a possible moderating factor. Financial incentives included a modest salary and subsidies, and non-financial incentives included a motorcycle, lunch, food, gifts and soap. We make the distinction between incentives given to the secondary implementer (community-member involved in the implementation) and the recipients (villagers/household members, receiving the promotional approach).

Table 3: Overview of studies describing the use of financial or non-financial incentives

Type of incentive	Promotional approach			
	Community-based approach	Social marketing approach	Sanitation and hygiene messaging	Elements of psychosocial theory
Financial incentives to secondary implementer	Huda et al., 2012: a modest salary, +/- 1 US dollar per day (approximately one half that of an unskilled laborer), for the community hygiene promotors			
Financial incentives (subsidies) to recipients	Patil et al., 2013, 2015: subsidies for households to offset the capital costs of toilets Pattanayak et al., 2009: small subsidies in encouraging the poor to construct individual household latrines Guiteras et al., 2015b: neighborhoods received latrine vouchers which offered a 75% discount on the components of any of the three models of hygienic latrine	Dickey et al., 2015: subsidies in both the intervention and control group		
Non-financial incentives to secondary implementer	Waterkeyn & Cairncross, 2005: provision of a reliable motor-cycle, and a nominal lunch allowance, for the Environmental Health Technicians			
Non-financial incentives to recipient		Arnold et al., 2009: a small ration of rice, beans and oil to the families (mothers receiving education) Biran et al., 2009: exchange soap wrappers for gifts	Seimetz et al., 2016: three bars of soap for each respondent who participated in both the pre- and the post-interview	Langford & Panter-Brick, 2013: a new bar of soap to each mother at the community meetings, given by The Community Motivators

- Communication strategies

All intervention programmes (n=55) used (at least) interpersonal communication channels: 22 interventions (40%) used interpersonal communication only, 16 interventions (29%) used interpersonal+mass media communication, 7 interventions (13%) used interpersonal+traditional communication and 10 interventions (18%) used interpersonal+mass media+tradional communication.

The programmes with a promotional approach in the control group (n=10) were promoted via interpersonal communication only (n=5), via mass media communication only (n=1), via traditional communication only (n=1), via interpersonal+mass media communication (n=1) or via interpersonal+mass media+traditional communication channels (n=2).

- Implementers (see Figure 7)

Almost all studies (n=40, 95%) reported who the implementers of the programme were. Information about training/qualification of the implementers (n=24, 57%), the role of the evaluator (n=18, 43%) and gender of the implementers (n=11, 26%) was less frequently reported. Information about ethnicity (n=4, 9%), age (n=4, 9%) and socio-economic status (n=4, 9%) of the implementers was rarely reported.

- Implementing organization (see Figure 8)

In general, information about the implementing organization was not frequently reported: about 30% of the studies provided information about leadership (n=15), the quality of the training materials (n=14), technical support or supervisory guidance (n=14). Funding information (about the programme (not the study)) was provided in 10 studies (24%) and only 2 studies (5%) provided information on partnership/coordination between providers.

- Process evaluation factors (see Figure 9)

Recruitment (n=34, 81%) and dose (n=33, 78%) were frequently reported. Forty-three percent of the studies provided information on reach (n=18) or adaptation (n=21, 50%) whereas information on fidelity (n=5), implementer engagement (n=5), participation engagement (n=7) or co-intervention (n=4) was only reported in 10-20% of the studies. No studies had information on composite implementation measures.

- Outcomes

In total, 559 different outcomes (i.e. different outcome descriptions, timing of measurement, method of assessment, and reported statistics) were measured across all studies.

Raw data were available in most of the studies (n=39, 93%): binary data (n=18), continuous data (n=12), binary+continuous data (n=7), continuous+correlation data (n=1) and binary data+calculated effect sizes (n=1). Three studies (7%) only reported calculated effect size measures.

Primary (behaviour change) outcomes were reported in 39 studies: intention in 2 studies, handwashing (with or without soap) in 12 studies, handwashing at key times in 21 studies, latrine use in 9 studies, faeces disposal practices in 9 studies and open defecation in 9 studies. The following behavioural factors (secondary outcomes) were assessed: knowledge in 12 studies, skills in 6 studies, attitude in 5 studies, and self-regulation in 4 studies. Morbidity and mortality (secondary outcomes) were measured in 11 studies and 1 study, respectively.

Outcomes were assessed via self-reported measures in 27 studies (64%), via direct observation in 10 studies (24%), or via self-reported measures plus direct observation in 5 studies (13%).

The timing of outcome assessment was different across studies: 18 studies assessed the outcomes during the programme implementation (i.e. uptake), 16 studies assessed the outcomes within 12 months after the end of the implementation (i.e. adherence) and only 5 studies measured the outcomes more than 12 months after the end of the implementation (i.e. longer-term use). Three studies assessed outcomes at two different time points: 1 study at uptake+adherence, 1 study at uptake+longer-term use and 1 study at adherence+longer-term use.

4.1.3 Excluded studies

After title and abstract screening, 522 full texts (401 from databases and 121 from grey literature) were screened for eligibility. The majority of these full-texts were excluded (n=461, 88%) for different reasons: study design (n=242, 52%), intervention (n=95, 21%), outcome (n=77, 16%), population (n=12, 3%), duplicates (n=24, 5%), not available (n=11, 2%). Detailed information can be found in Appendix 9 (List of excluded database studies) and 6 (List of excluded grey literature studies), and the reference list of excluded studies.

4.2 RISK OF BIAS IN INCLUDED STUDIES

4.2.1 Experimental studies (n=32)

A visual overview of the risk of bias of the experimental studies can be found in Figure 10.

- Random sequence generation

Many studies did not provide clear information on the way the randomization sequence was generated. In 14 of the 32 studies (44%) the randomization sequence was clearly described, and assigned as being at low risk of selection bias. In 18 of the 32 studies (56%), not enough information was provided to determine if the method of random sequence generation was adequate.

Figure 10: Risk of bias in the experimental studies

Study	Random sequence generation *(selection bias)*	Allocation concealment (*selection bias)*	Blinding of participants *(performance bias)*	Blinding / method of outcome assessment (d*etection bias*)	Incomplete outcome data (a*ttrition bias)*	Selective reporting *(reporting bias*)	Other bias
Abiola et al., 2012							
Biran et al., 2009							
Biran et al., 2014							
Bowen et al., 2013							
Briceno et al., 2015							
Cameron et al., 2013							
Caruso et al., 2014							
Chase & Do, 2012							
Galiani et al., 2012/2015							
Graves et al., 2011							
Guiteras et al., 2015							
Guiteras et al., 2015b							
Hoque et al., 1994/1996							
Huda et al., 2012							
Jinadu et al., 2007							
Kaewchana et al., 2012							
Langford & Panter-Brick, 2013							
Lansdown et al., 2002							
Lhakhang et al., 2015							
Luby et al., 2009							
Luby et al., 2010							
Mascie-Taylor et al., 2003							
Patil et al., 2013/2015							
Pattanayak et al., 2009							
Phuanukoonnon et al., 2013							
Pickering et al., 2013							
Pickering et al., 2015							
Stanton & Clemens, 1987							
Tumwebaze & Mosler, 2015							
Wang et al., 2013							
Yeager et al., 2002							
Zhang et al., 2013							

green: low risk of bias; yellow: no information; red: high risk of bias

- Allocation concealment

In two studies (6%), Guiteras et al. (2015b) and Pattanayak et al. (2009), allocation concealment was described, and was assessed to be a low risk of bias. In two studies (6%), Pickering et al. (2015) and Huda et al. (2012), allocation concealment was not conducted and thus assessed as high risk of bias. The majority of studies (n=28, 88%) did not provide any information to assess risk of bias and were thus assigned as unclear.

- Blinding of participants

Blinding of participants to a treatment group was not easy for this type of intervention, and only one study (2%), Biran et al. (2014), reported on blinding of participants. In 18 studies (56%), there

was a lack of information about blinding, and these studies were rated as unclear. Thirteen studies (42%) reported no blinding of participants.

- Blinding of outcome assessors

No information on blinding of outcome assessors was given in 12 of the studies (37%), with 11 studies (34%) reporting no blinding and 9 studies clearly indicating that outcome assessors were blinded (28%). Self-reported outcomes were assessed in 18 studies (56%) whereas 14 studies (44%) measured outcomes via direct observation techniques.

- Incomplete outcome data

Incomplete outcome data was clearly dealt with in 5 studies (16%), with the many studies (n=13, 40%) having not dealt with this issue. In the remaining 14 studies (44%), there was no information on how incomplete outcome data was dealt with.

- Selective reporting

Selective reporting bias was found to be present in many studies (20/32, 62%), with only 5 studies (16%) reporting having dealt adequately with this bias. No information was present in 7 studies, and these were rated as unclear.

- Other risks of bias

There were no other risks of bias in the majority of the studies (20/32, 62%). There were other risks of bias in 10 studies (high risk, 31%) and two studies (6%) did not provide any information regarding other risks of bias. No intra-cluster correlations (ICC) were reported in 15 of the 22 cluster RCTs.

4.2.2 Quasi-experimental (n=8) and observational studies (n=2)

A visual overview of the risk of bias of the quasi-experimental and observational studies can be found in Figure 11. The observational studies both were cohort studies (Arnold et al., 2009, Seimetz et al., 2016).

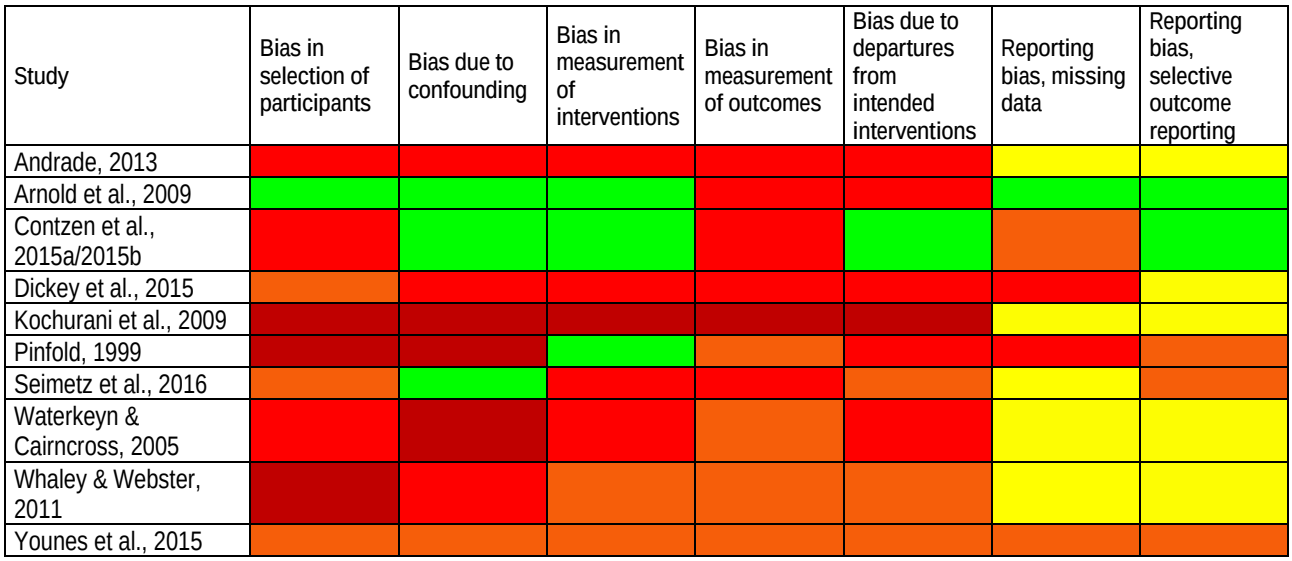
- Bias in selection of participants

Three studies (30%) were assessed to be at a critical level for this category. Three studies (30%) were judged to have serious bias and three were moderate. Only the Arnold et al. (2009) study was judged to be of low bias, as the selection into the study (or into the analysis) was unrelated to intervention or unrelated to outcome. The start of follow-up and start of intervention coincided for most participants, and there were adjustment techniques used that were likely to correct for the presence of selection biases. The allocation mechanism was also appropriate to generate equivalent groups.

- Bias due to confounding

There were 4 studies (40%) judged to have critical level of bias due to confounding. An equal number had a low risk of bias, as the authors used an appropriate analysis method that controlled for all the important confounding areas (baseline confounding). The authors also used an appropriate analysis method that controlled for time-varying confounding, if present, and confounding areas that were controlled for measured validly and reliably by the variables available in this study. The remaining studies were judged to be of moderate (1) and serious (3) bias.

Figure 11: Risk of bias in the quasi-experimental and observational studies



green: low; yellow: no information; orange: moderate; red: serious; dark red: critical

- Bias in measurement of interventions

Three studies (30%) had a low bias in measurement of interventions, with 3 studies (30%) being judged as moderate and 4 studies (40%) being judged as serious. One study, Kochurani et al. (2009), was evaluated to have critical bias as the intervention was not well defined, the information used to define intervention groups was not recorded at the start of the intervention, and information on intervention status was affected by knowledge of the outcome or risk of the outcome.

- Bias in measurement of outcomes

Four studies (40%) showed moderate bias in this category and 5 studies (50%) were judged as serious. One study, Kochurani et al. (2009), was deemed to show critical bias as this study did not have an objective outcome measure. The methods of outcome assessment were not comparable across intervention groups, and outcome assessors were aware of the interventions that the groups received.

- Bias due to departures from intended intervention

The Contzen et al. (2015a/2015b) study had a low risk of bias and three other studies were of moderate bias. Five studies (50%) were shown to have serious bias, and the Kochurani et al. (2009) study was assessed to have critical levels of bias as the important co-interventions were not balanced across intervention groups, the study participants did not adhere to the assigned intervention regimen, and the intervention was not implemented successfully for most participants.

- Reporting bias (missing data + selective outcome reporting)

The reporting biases as discussed here incorporate biases because of missing data and selective outcome reporting. The Arnold et al. (2009) study showed low bias for both aspects of reporting bias. Contzen et al. (2015a/2015b) showed low bias in the selective outcome reporting category, but moderate for the missing data category. Andrade (2013), Dickey et al. (2015), Kochurani et al. (2009), Seimetz et al. (2016), Waterkeyn & Cairncross (2005) and Whaley & Webster (2011) provided no information on reporting bias and were assessed as unclear. Both Pinfold (1999), and Seimetz et al. (2016) were assessed as moderate for the selective outcome reporting category.

4.3 SYNTHESIS OF RESULTS

Studies were very heterogenous (various promotional approaches and different outcomes), which made it difficult to present the study findings. In the first part of the results (4.3.1) we first compared any promotional approach versus no promotional approach. We pooled similar outcomes across promotional approaches, and created meta-analyses for the following outcomes:

- Handwashing after toilet use
- Handwashing before cooking
- Handwashing after cleaning a child's anus
- Handwashing before eating
- Handwashing before feeding a child
- Latrine use
- Safe faeces disposal
- Safe child faeces disposal
- Open defecation
- Skills: using soap for handwashing
- Skills: rubbing hands together at least 3 times
- Skills: lathering hands more than 10 seconds
- Skills: drying hands with a clean towel

In addition to the outcomes captured in the meta-analyses, many individual outcomes were reported that could not be pooled because of variation in study designs, outcome measures, or timing of measurement. Therefore, all data were also presented individually, and grouped in separate forest plots according to the promotional approach, outcome and timing of measurement (uptake, adherence or longer-term use). This is the second part of the results section, comparing a certain promotional approach versus no promotional approach. For this purpose, we grouped the

outcomes in six major groups (according to our ToC):

- Behaviour change (primary outcomes): handwashing (handwashing with soap, handwashing without soap, handwashing at key times).
- Behaviour change (primary outcomes): latrine use.
- Behaviour change (primary outcomes): safe faeces disposal.
- Behaviour change (primary outcomes): open defecation.
- Behavioural factors (secondary outcomes); outcomes were grouped under "knowledge", "skills", "attitude", "norms" and "self-regulation".
- Health outcomes (secondary outcomes); outcomes were grouped under "morbidity" and "mortality".

In a next section (4.3.2), different types of promotional approaches are compared. Finally, we looked at the effect of different communication strategies to the same promotional approach (4.3.3).

4.3.1 Promotional approach versus no promotional approach

In 34 studies the effect of using a promotional approach was compared with not using a promotional approach. Of these studies, 12 studies described a community-based approach, 6 studies described a social marketing approach, 12 studies described sanitation and hygiene messaging, and 4 studies described a small-scale intervention based on elements of psychosocial theory. An overview of the studies included in each category of promotional approaches (compared to not using a promotional approach) can be found in Table 4.

Table 4. Overview of the studies comparing a promotional approach versus no promotional approach (control group), divided into the 4 categories of promotional approaches.

Promotional approach versus no promotional approach			
Community-based approach	Social marketing approach	Sanitation and hygiene messaging	Elements of psychosocial theory
Andrade, 2013	Arnold et al., 2009	Abiola et al., 2012	Biran et al., 2014
Guiteras et al., 2015b	Biran et al., 2009	Bowen et al., 2013	Langford & Panter-Brick, 2013
Hoque et al., 1994/1996	Briceno et al., 2015	Caruso et al., 2014	Luby et al., 2010
Huda et al., 2012	Cameron et al., 2013	Kaewchana et al., 2012	Tumwebaze & Mosler, 2015
Jinadu et al., 2007	Galiani et al., 2012/2015	Lansdown et al., 2002	
Kochurani et al., 2009	Pinfold, 1999	Luby et al., 2009	
Patil et al., 2013/2015		Mascie-Taylor et al., 2003	
Pattanayak et al., 2009		Pickering et al., 2013	
Phuanukoonnon et al., 2013		Seimetz et al., 2016	
Pickering et al., 2015		Stanton & Clemens, 1987	
Waterkeyn & Cairncross, 2005		Wang et al., 2013	
Younes et al., 2015		Yeager et al., 2002	

4.3.1.1 Any promotional approach

For the list of predefined outcomes (see above) meta-analyses were performed across the different promotional approaches and different times of measurement. For each meta-analysis, subgroup analyses according to the promotional approach were performed, and where possible according to timing of measurement. However, for 11 of the 13 outcomes there was too much heterogeneity to be able to make conclusions across the different types of promotional approaches. The pooled value

per promotional approach is reported below in case no statistical heterogeneity was present. Below we describe the results for the 1 different outcomes:

- Behaviour change: handwashing after toilet use (Analysis 1). Since there was too much heterogeneity it was not possible to pool the outcomes across promotional approaches. Only for the community-based approaches, a level of heterogeneity < 50% was found. A community-based approach may make little or now difference in handwashing after toilet use (RR 1.06, 95 %CI [0.99, 1.14]; level of certainty: low, Table 5) (Huda et al., 2012; Phuanokoonnon et al., 2013).

- Behaviour change: handwashing before cooking (Analysis 2). There was no significant increase in handwashing for the community-based approach (RR 0.94, 95% CI [0.31, 2.91]) (Huda et al., 2012). Sanitation and hygiene messaging may improve handwashing before cooking (RR 1.23, 95% CI [1.09, 1.39]; level of certainty: low (Table 6)) (Bowen et al., 2013; Stanton & Clemens, 1987). The effect of elements of psychosocial theory on handwashing before cooking is uncertain (RR 33.06, 95% CI [6.72, 162.69]; level of certainty: very low (Table 7)) (Langford & Panter-Brick, 2013; Luby et al., 2010).

- Behaviour change: handwashing after cleaning a child's anus (Analysis 3). There was noA significant increase in handwashing for the community-based approach (RR 1.34, 95% CI [0.85, 2.12]) (Huda et al., 2012). For the other approaches and "overall promotional approach" there was too much heterogeneity to be able to make overarching conclusions.

- Behaviour change: handwashing before eating (Analysis 4). A community-based approach may lead to slightly improved handwashing before eating (RR 1.12, 95% CI [1.02, 1.22]; level of certainty: low (Table 8)) (Huda et al., 2012; Phuanukoonnon et al., 2013), while elements of psychosocial theory may improve it (RR 34.73, 95% CI [4.90, 246.39]; level of certainty: low (Table 9)) (Langford & Panter-Brick, 2013; Luby et al., 2010). In case of sanitation and hygiene messaging, there was too much heterogeneity to be able to make overall conclusions.

- Behaviour change: handwashing before feeding a child (Analysis 5). The effect of a community-based approach is uncertain (RR 1.04, 95% CI [0.94, 1.15]; level of certainty: very low (Table 10)) (Huda et al., 2012, Phuanukoonnon et al., 2013). A theory-based approach may improve handwashing before feeding a child (RR 3.63, 95% CI [1.91, 6.88]; level of certainty: low (Table 11)) (Langford & Panter-Brick, 2013; Luby et al., 2010).

- Behaviour change: latrine use (Analysis 6). High heterogeneity across the studies (all using a community-based approach) did not make it possible to pool the outcomes. Therefore, we were not able to make any overall conclusions for this outcome. However, when a subgroup analysis was performed according to timing of measurement (adherence and longer-term use), a community-based approach may improve latrine use less than 12 months after the end of programme implementation (adherence) (RR 2.63, 95% CI [1.62, 4.29]; level of certainty: low (Table 12)) (Jinadu et al., 2007; Pattanayak et al., 2009).

- Behaviour change: safe faeces disposal practices and safe child faeces disposal practices (Analysis 7 and 8). Since there was too much heterogeneity it was not possible to pool the outcomes across and within the promotional approaches. For sanitation and hygiene messaging, only one study was included, showing statistically significant increased safe faeces disposal practices (RR 1.68, 95% CI [1.21, 2.32]), however a significant effect on safe child faeces disposal practices could not be demonstrated (RR 1.07, 95% CI [0.70, 1.65]) (Yeager et al., 2002).

- Behaviour change: open defecation (Analysis 9). A community-based approach resulted in a statistically significantly decrease in open defecation (RR 0.40, 95% CI [0.37, 0.44]) (Pickering et al., 2015). Sanitation and hygiene messaging may make little or no difference in open defecation (RR 0.99, 95% CI [0.72, 1.37]; level of certainty: low (Table 13)) (Lansdown et al., 2002; Stanton & Clemens, 1987; Wang et al., 2013).

- Behavioural factors: skills: using soap for handwashing (Analysis 10). Sanitation and hygiene messaging probably slightly improves using soap for handwashing (handwashing technique) (RR 1.05, 95% CI [1.02, 1.08]; level of certainty: moderate (Table 14)) (Bowen et al., 2013; Luby et al., 2009). No studies on other approaches measured this outcome.

- Behavioural factors: skills: rubbing hands together at least 3 times (Analysis 11). Only studies using sanitation and hygiene messaging measured if there was an improvement in rubbing the hands together at least 3 times (Bowen et al., 2013; Luby et al., 2009). Since there was too much heterogeneity it was not possible to pool the data, and it was not possible to make any overall conclusions for this outcome.

- Behavioural factors: skills: lathering hands > 10 seconds (Analysis 12). Only studies using sanitation and hygiene messaging measured if lathering hands for more than 10 seconds (handwashing technique) had increased (Bowen et al., 2013; Luby et al., 2009). Since there was too much heterogeneity it was not possible to pool the data, and it was not possible to make any overall conclusions for this outcome.

- Behavioural factors: skills: drying hands with a clean towel (Analysis 13). Only studies using sanitation and hygiene messaging measured if drying hands with a clean towel (handwashing technique) had resulted in an increase (Bowen et al., 2013; Luby et al., 2009). Since there was too much heterogeneity it was not possible to pool the data, and it is not possible to make any overarching conclusions for this outcome.

We also expressed the effect measures as Risk Differences (RD), showing the absolute effect, instead of Risk Ratios (RR) (Table 15).

Table 15: Risk ratio and risk difference

Outcome		RR, [95% CI]		RD, [95% CI]	
	Number of studies	Results	I^2 (%)	Results	I^2 (%)
Handwashing after toilet use					
Total	8	1.24, [1.00, 1.54]	96.5	0.12, [0.02, 0.22]*	94.0
Community-based approach	2	1.06, [0.99, 1.14]	0.0	0.06, [-0.00, 0.11]	0.0
Sanitation and hygiene messaging	4	1.12, [0.80, 1.57]	97.8	0.07, [-0.06, 0.20]	95.4
Elements of psychosocial theory	2	1.99, [0.15, 25.93]	99.0	0.31, [-0.20, 0.83]	97.7
Handwashing before cooking					
Total	5	2.42, [0.97, 6.04]	88.3	0.23, [0.01, 0.44]*	98.7
Community-based approach	1	0.94, [0.31, 2.91]	-	-0.00, [-0.01, 0.01]	-
Sanitation and hygiene messaging	2	1.23, [1.09, 1.39]*	0.0	0.15, [0.07, 0.23]*	0.0
Elements of psychosocial theory	2	33.06, [6.72, 162.69]*	0.0	0.43, [-0.13, 0.98]	98.2
Handwashing after cleaning a child's anus					
Total	5	1.24, [0.97, 1.59]	60.9	0.13, [0.01, 0.26]*	82.7
Community-based approach	1	1.34, [0.85, 2.12]	-	0.09, [-0.05, 0.23]	-
Sanitation and hygiene messaging	2	1.10, [0.64, 1.90]	80.7	0.03, [-0.11, 0.17]	82.9
Elements of psychosocial theory	2	2.23, [0.27, 18.63]	90.5	0.33, [-0.05, 0.71]	87.7
Handwashing before eating					
Total	6	1.34, [0.83, 2.18]	97.8	0.13, [0.04, 0.22]*	96.7
Community-based approach	2	1.12, [1.02, 1.22]*	0.0	0.05, [-0.07, 0.16]	88.7
Sanitation and hygiene messaging	2	1.06, [0.81, 1.39]	54.9	0.05, [-0.14, 0.23]	52.7
Elements of psychosocial theory	2	34.73, [4.90, 246.39]*	0.0	0.32, [-0.08, 0.71]	96.9
Handwashing before feeding a child					
Total	4	1.82, [0.71, 4.66]	87.3	0.16, [-0.01, 0.34]	92.6
Community-based approach	2	1.04, [0.94, 1.15]	0.0	0.01, [-0.01, 0.02]	0.0
Elements of psychosocial theory	2	3.63, [1.91, 6.88]*	0.0	0.35, [0.07, 0.63]*	73.2
Latrine use					
Total	4	3.63, [0.79, 16.78]	99.1	0.31, [-0.04, 0.67]	99.4
Community-based approach: Adherence	2	2.63, [1.62, 4.29]*	0.0	0.13, [-0.05, 0.30]	86.3
Community-based approach: Longer-term use	2	4.02, [0.44, 37.13]	99.7	0.50, [-0.04, 1.03]	99.7
Safe faeces disposal					
Total	3	1.63, [1.29, 2.08]*	57.2	0.17, [0.01, 0.32]*	92.8
Community-based approach	2	1.67, [1.10, 2.53]*	76.5	0.17, [-0.06, 0.40]	95.9

Sanitation and hygiene messaging	1	1.68, [1.21, 2.32]*	-	0.17, [0.07, 0.27]*	-
Elements of psychosocial theory	-	-	-	-	-
Safe child faeces disposal					
Total	3	1.65, [0.62, 4.39]	92.8	0.14, [-0.15, 0.43]	96.8
Community-based approach	2	2.07, [0.59, 7.22]	88.0	0.20, [-0.18, 0.59]	96.7
Sanitation and hygiene messaging	1	1.07, [0.70, 1.65]	-	0.01, [-0.07, 0.10]	-
Open defecation					
Total	4	0.61, [0.21, 1.81]	99.6	-0.18, [-0.46, 0.10]	98.1
Community-based approach	1	0.40, [0.37, 0.44]*	-	-0.33, [-0.36, -0.31]*	-
Sanitation and hygiene messaging	3	0.99, [0.72, 1.37]	36.0	-0.11, [-0.38, 0.16]	73.2
Skills: using soap for handwashing					
Total	2	1.05, [1.02, 1.08]*	1.4	0.05, [0.02, 0.08]*	0.0
Sanitation and hygiene messaging	2	1.05, [1.02, 1.08]*	1.4	0.05, [0.02, 0.08]*	0.0
Skills: rubbing hands together at least 3 times					
Total	2	5.78, [0.84, 39.71]	97.0	0.61, [-0.09, 1.31]	99.6
Sanitation and hygiene messaging	2	5.78, [0.84, 39.71]	97.0	0.61, [-0.09, 1.31]	99.6
Elements of psychosocial theory	-	-	-	-	-
Skills: lathering hands > 10 sec					
Total	2	6.25, [1.03, 38.11]*	95.9	0.56, [-0.07, 1.19]	99.5
Sanitation and hygiene messaging	2	6.25, [1.03, 38.11]*	95.9	0.56, [-0.07, 1.19]	99.5
Skills: drying hands with a clean towel					
Total	2	1.68, [0.62, 4.55]	95.2	0.14, [0.02, 0.26]*	78.0
Sanitation and hygiene messaging	2	1.68, [0.62, 4.55]	95.2	0.14, [0.02, 0.26]*	78.0

All risk ratios and risk differences are presented as Cochran-Mantel-Haenszel Estimate, [95% CI]. RR: Risk Ratio; CI: Confidence Interval; RD: Risk Difference; I^2: heterogeneity; *p≤0.05

We performed a sensitivity analysis for the use of incentives as part of the promotional approach (see Table 16, forest plots available upon request). Three studies made use of financial or non-financial incentives, including providing a modest salary to the secondary implementer as part of a community-based approach (Huda et al., 2012), providing small subsidies to the households as part of a community-based approach (Pattanayak et al., 2009), and providing a bar of soap as part of a theory-based approach (Langford & Panter-Brick, 2013).

Table 16: Risk ratios in studies describing programmes including incentives versus programmes without use of incentives

Outcome	RR, [95% CI] (incentives)			RR, [95% CI] (no incentives)		
	Number of studies	Results	I^2 (%)	Number of studies	Results	I^2 (%)
Handwashing after toilet use						
Community-based approach	1	1.27, [0.72, 2.23]	-	1	1.06, [0.99, 1.14]	-
Elements of psychosocial theory	1	1.10, [0.99, 1.22]	-	1	3.62, [2.20, 5.93]*	-
Handwashing before cooking						
Community-based approach	1	0.94, [0.31, 2.91]	-	-	-	-
Elements of psychosocial theory	1	30.58, [4.37, 214.06]*	-	1	38.75, [2.41, 622.42]*	-
Handwashing after cleaning a child's anus						
Community-based approach	1	1.34, [0.85, 2.12]	-	-	-	-
Elements of psychosocial theory	1	1.19, [1.04, 1.37]*	-	1	4.74, [1.29, 17.44]*	-
Handwashing before eating						
Community-based approach	1	1.14, [0.63, 2.04]	-	1	1.12, [1.02, 1.22]*	-
Elements of psychosocial theory	1	43.21, [2.71, 688.87]*	-	1	27.89, [1.74, 446.44]*	-
Handwashing before feeding a child						
Community-based approach	1	1.35, [0.63, 2.92]	-	1	1.04, [0.94, 1.14]	-
Elements of psychosocial theory	1	3.58, [1.85, 6.92]*	-	1	4.50, [0.27, 75.60]	-
Latrine use						
Community-based approach: adherence	1	2.59, [1.58, 4.25]*	-	1	4.74, [0.24, 95.33]	-
Safe child faeces disposal						
Community-based approach	1	1.11, [0.50, 2.49]	-	1	1.44, [1.27, 1.65]*	-

All risk ratios are presented as Cochran-Mantel-Haenszel Estimate, [95% CI]. RR: Risk Ratio; CI: Confidence Interval; I^2: heterogeneity; *p≤0.05

In Table 16 we present the findings of the studies describing programmes with incentives versus studies where no incentives were used. Focussing on findings from studies with low heterogeneity (< 50%), we found: (1) statistically significant improvement in handwashing after toilet use (RR 3.62, 95% CI [2.20, 5.93], elements of psychosocial theory), handwashing before eating (RR 1.12, 95% CI [1.02, 1.22], community-based approach) and safe child faeces disposal (RR 1.44, 95% CI [1.27, 1.65], community-based approach) when using programmes without incentives, while this was not the case for similar programmes using incentives; (2) for handwashing before cooking, handwashing after cleaning a child's anus and handwashing before eating, both programmes (based on elements of psychosocial theory) with and without incentives had statistically significant positive effects, but the RR was larger for the programmes without incentives; (3) programmes that

used elements of psychosocial theory: statistically significant improvement in handwashing before feeding a child (RR 3.58, 95% CI [1.85, 6.92]), and in latrine use (RR 2.59, 95% CI [1.58, 4.25]) was found when using programmes making use of incentives, while this was not the case for programmes not using incentives; (4) no positive effects on handwashing after toilet use or before feeding a child were present in community-based interventions with or without incentives. Overall, the number of studies is too limited, and the type of incentives is too variable, to be able to make any firm conclusions based on these data.

In summary, because of a high degree of heterogeneity it was very difficult to make overall conclusions about the effectiveness of using any promotional approach versus no promotional approach, and about the effectiveness of a specific promotional approach. Since many other specific outcomes were measured that were not included in the meta-analyses because these were unique outcomes, we provide a more complete overview below, however without statistically pooling these.

4.3.1.2 Community-based approaches

From the 12 studies that we categorised as describing a community-based approach, 8 clearly described the approach as a formal community-based approach, and the following formal approaches were identified: community-led total sanitation (Guiteras et al., 2015b; Patil et al., 2013/2015; Pattanayak et al., 2009; Pickering et al., 2015), community-based interventions (Andrade, 2013; Jinadu et al., 2007) and community health clubs or women's groups (Waterkeyn & Cairncross, 2005; Younes et al., 2015). The other studies did not formally describe their approach as community-based approach, but clear elements of community involvement and engagement were described (Hoque et al., 1994/1996; Huda et al., 2012; Kochurani et al., 2009; Phuanokoonnon et al., 2013). One study was a school-based study (Kochurani et al., 2009), and Andrade (2013) worked at household, community and school level at the same time. All but one study had a sanitation component in the intervention: four studies only focused on sanitation, 7 studies looked at a mixed intervention (all WASH components in 6 cases, water supply/water quality and sanitation in one case) component, and only one study contained a handwashing only programme (see Figure 6).

Below we narratively describe the findings for the different outcome types. We specifically mention when the programme only consisted of a sanitation intervention, or handwashing intervention. In all other cases the programme contained all WASH elements.

- Behaviour change: handwashing (Analysis 14). One study, implementing a handwashing only intervention, measured handwashing at key times during the intervention period ("uptake") (Younes 2015). A significant increase in handwashing with soap before food preparations (RR 4.31, 95% CI [3.40, 5.45]), or before feeding a child was measured (RR 2.83, 95% CI [2.50, 3.20]) (certainty of evidence: low (Table 17)) (Younes et al., 2015). In two studies adherence outcomes were measured. In a sanitation only study with a moderate risk of bias a statistically significant increase in handwashing after cleaning children's faeces, and after defecation was found (RR 2.23, 95% CI [1.21, 4.10]) (Jinadu et al., 2007). A significant increase in "handwashing before eating" was shown (RR 1.12, 95% CI [1.02, 1.22]) in a smaller

experimental study with serious risk of bias, however a significant change could not be shown for 5 other key times (Phuanokoonnon et al., 2013). The certainty of evidence for the adherence outcomes was found to be low (Table 18). In addition, three studies measured longer-term use outcomes (Huda et al., 2012; Pickering et al., 2015; Kochurani et al., 2009). The community-based intervention, only containing a sanitation component, significantly improved handwashing with soap (MD 0.50, 95% CI [0.33, 0.67]) (Pickering et al., 2015). Kochurani et al. (2009), a school level study, found that the community-based intervention significantly increased the frequency of handwashing before eating (96% versus 61%, n=7,835; p<0.0001). However, a significant effect in handwashing at 7 different key times (including handwashing before eating) could not be demonstrated in an experimental study with serious risk of bias (Huda et al., 2012). The level of evidence for handwashing at longer term was found to be very low (Table 19).

- Behaviour change: latrine use (Analysis 15). A statistically significant increase in latrine use during the intervention period ("uptake") was measured (RR 1.88, 95% CI [1.39, 2.55]) (Waterkeyn & Cairncross, 2005). In Hoque et al. (1994/1996) it was shown that latrine use after the intervention increased by 89%, however no standard deviations were provided, so it was not possible to calculate confidence intervals. Adherence outcomes were measured in two different experimental studies, describing a sanitation only intervention, and a significant increase in overall latrine use (RR 2.59, 95% CI [1.58, 4.25]), and latrine use in children up to 24 months (RR 7.95, 95% CI [4.72, 13.40]) was shown (Pattanayak et al., 2009; Jinadu et al., 2007), however no difference in latrine use in children between 25 and 60 months could be shown (RR 4.74, 95% CI [0.24, 95.33]) (Jinadu et al., 2007). The adherence outcomes had a low certainty of evidence (Table 20). In the longer term statistically significantly increased overall latrine use (RR 1.48, 95% CI [1.37, 1.59]), latrine use by males (RR 10.40, 95% CI [7.59, 14.26]), latrine use by females (RR 11.70, 95% CI [8.36, 16.37]), and potty use by children (RR 3.28, 95% CI [2.90, 3.71]) was shown (Hoque et al., 1994/1996; Pickering et al., 2015). The certainty of evidence for the longer-term outcomes was found to be low (Table 21). The study by Pickering et al. (2015) was a sanitation-only intervention, while Hoque et al. (1994/1996) combined sanitation with a water supply/water quality intervention.

- Behaviour change: safe faeces disposal (Analysis 16). Two studies measured outcomes during the study period ("uptake") (Waterkeyn & Cairncross, 2005; Patil et al., 2013/2015). A statistically significant increase of "not disposing faeces in the open" (RR 2.41, 95% CI [1.99, 2.90]) was demonstrated in a quasi-experimental study (Waterkeyn & Cairncross, 2005). No difference in the presence of child faeces in the yard was shown (Waterkeyn & Cairncross, 2005). Patil et al. (2013/2015), describing a sanitation-only intervention, reported this outcome result as means, but no standard deviations were given. From the paper, the ITT adjusted difference between intervention and control was 0.075, 95% CI [0.036, 0.113] for child faeces disposal (in favour of the community-based intervention) and 0.019, 95% CI [-0.026, 0.065] for "no faeces observed in living area", the latter being non-significant. The certainty of evidence for the uptake outcomes was assessed as very low (Table 22). Significant outcomes were also shown in the period less than 12 months after the programme period ("adherence"): child faeces disposal (RR 2.16, 95% CI [1.60, 2.91]) and no faeces lying around (RR 1.44, 95%

CI [1.27, 1.65]), in a study implementing a sanitation-only intervention (Jinadu et al., 2007). The certainty of evidence for the adherence outcomes was assessed as moderate (Table 23). In the longer term a significant increase in not leaving human faeces in the compound was shown in an experimental study (sanitation-only) with moderate risk of bias (RR 2.07, 95% CI [1.40, 3.05]) (Pickering et al., 2015), but a significant effect on child faeces disposal could not be demonstrated in an experimental study with serious risk of bias (RR 1.02, 95% CI [0.45, 2.35]) (Huda et al., 2012). The certainty of evidence for longer-term outcomes was found to be low (Table 24).

- Behaviour change: open defecation (Analysis 17). One experimental study, describing a sanitation-only programme, measured outcomes during the study period ("uptake") (Patil et al., 2013/2015). The study reported this outcome result as means, but no standard deviations were given. The ITT adjusted difference between intervention and control was -0.087, 95% CI [-0.135, -0.038] for men, -0.091, 95% CI [-0.141, -0.041] for women and -0.054, 95% CI [-0.088, -0.020] for children, thus the community-based intervention significantly reduced open defecation in men, women and children. The certainty of evidence for the uptake outcomes was moderate (Table 25). One study, implementing a sanitation-only intervention, measured adherence outcomes, and found a statistically significant decrease of open defecation in case of a latrine promotion program combined with use of subsidies (MD -9.00, 95% CI [-13.70, -4.30]) or a combination of subsidies and a supply intervention (MD -9.00, 95% CI [-14.10, -3.90]). No significant effect was shown in case of the supply intervention alone (MD -2.50, 95% CI [-10.73, 5.73]) (Guiteras et al., 2015b). The certainty of evidence for the adherence outcomes was found to be moderate (Table 26). Three studies measured open defecation in the longer term (Guiteras et al., 2015b; Pickering et al., 2015; Kochurani et al., 2009). A statistically significant decrease in open defecation on the longer term was shown in adult women, adult men, and children younger and older than 5 years in one study with a sanitation-only intervention (Pickering et al., 2015), however this could not be shown in case of a latrine promotion program in the study by Guiteras et al. (2015b) (MD -2.10, 95% CI [-7.20, 3.00]). Kochurani et al. (2009) found that the community-based intervention in schools significantly reduced the number of girls practicing open defecation (1% versus 9%, n=7,835; p=0.004), however for boys no significant difference was found (30% versus 23%; p=0.12). Open defecation at the longer term had a certainty of evidence of very low (Table 27).

- Behavioural factors (Analysis 18). Three studies measured knowledge (Andrade, 2013; Kochurani et al., 2009; Phuanukoonnon et al., 2013). Andrade (2013) showed statistically significantly increased disease transmission knowledge and knowledge of key handwashing times at 1 and 2 years following the implementation of the intervention (see forest plot). For Kochurani et al. (2009), a quasi-experimental study with critical risk of bias, there was no difference in knowledge of handwashing before eating, in a group of school boys and girls. However, the community-based intervention significantly increased knowledge of handwashing after using the toilet (girls: 100% vs 93%, p=0.001; boys: 100% vs 85%, p<0.001) and knowledge on the health advantages of handwashing (girls: 98% vs 88%, p=0.002; boys: 100% vs 77%, p<0.001). For Phuanukoonnon et al. (2013) significantly higher mean knowledge scores were observed in the community-based intervention compared to the control group,

concerning the fact that diarrhoea can cause weight loss among children (3.66 versus 3.47 (out of 4), n=395, p<0.05). No effect was shown for 6 other outcomes concerning knowledge about causes and consequences of diarrhoea (Phuanukoonnon et al. 2013).

- Health outcomes (Analysis 19-20). A significant decrease in diarrhoea in children over 5 years old (RR 0.45, 95% CI [0.31, 0.64]) (Hoque et al., 1994/1996), and in acute respiratory tract illness (RR 0.58, 95% CI [0.45, 0.75]) (Younes et al., 2015) was shown. However, a significant effect on overall diarrhoea, and diarrhoea in children under 5 years old, could not be demonstrated in three studies (Hoque et al., 1994/1996; Pickering et al., 2015; Huda et al., 2012). In addition, using the ITT adjusted mean difference for the mean number of cases reported in the previous 7 days, Patil et al. (2013/2015) found no difference in cases of diarrhoea (-0.002, 95% CI [20.019, 0.015]) and high credible gastrointestinal illness (-0.002, 95% CI [20.024, 0.020]), but found that there were more cases of acute lower respiratory tract illness in the control group than in the intervention group (0.049, 95% CI [0.009, 0.089]) (Patil et al., 2013/2015). One experimental study with moderate risk of bias measured mortality outcomes (Pickering et al., 2015). A significant decrease of all-cause mortality and diarrhoea-related mortality was not found (Pickering et al., 2015).

- Influence of incentives in programs. From the 12 studies describing community-based approaches, 5 studies described the use of incentives (see Table 3), including a modest salary to the hygiene promotors (Huda et al., 2012), a motorcycle and lunch to the health technicians (Waterkeyn & Cairncross, 2005), and subsidies to households (Guiteras et al., 2015b; Patil et al., 2013, 2015; Pattanayak et al., 2009). For these studies: (1) when providing additional incentives to the secondary implementers, there was a significant improvement of latrine use and safe faeces disposal on the short term (uptake) (Waterkeyn & Cairncross, 2005), but no significant effects on handwashing and safe faeces disposal on the longer term (Huda et al., 2012, serious risk of bias); (2) when providing incentives to the recipients of the programme, a significant improvement of safe faeces disposal and open defecation (uptake, adherence), and latrine use (adherence) was found. When comparing absolute effect measures of the individual outcomes between the studies with or without use of incentives, no major differences were found. However, Guiteras (2015b) compared a community-based intervention with and without use of subsidies (i.e. latrine vouchers), and found significant better results for open defecation when subsidies were given as an additional incentive.

4.3.1.3 Social marketing approaches

From the 6 studies that we grouped in the category “social marketing approaches”, 5 studies formally described that they used a marketing campaign or social marketing techniques or interventions (Biran et al., 2009; Briceno et al., 2015; Cameron et al., 2013; Galiani et al., 2012/2015; Pinfold, 1999). Two of these studies implemented their intervention at school level (Galiani et al., 2012/2015; Pinfold, 1999). One study did not describe their approach as a formal social marketing approach, but used several elements that are generally part of a social marketing approach (infrastructure promotion, use of incentives) (Arnold et al., 2009). Since for the study of Galiani et al. (2012/2015) no raw data were available, the data represented are adjusted for

confounding factors (gender and education of household head, children's age and gender, mother living in the home, rainfall and geographical region). All but one study had a handwashing component in the intervention (in contrast to the community-based approaches, where the focus was a sanitation intervention): four studies described a handwashing-only intervention, with one of these also studying an intervention arm with sanitation-only and a combined intervention, one study combined the handwashing intervention with a water supply/water quality component, and two studies included a sanitation-only intervention (see Figure 6).

Below we narratively describe the findings for the different outcome types. Since the majority of the studies had a handwashing-only intervention, we only mention the intervention specifically in case of a sanitation or combined programme.

- Behaviour change: handwashing (Analysis 21). Ony study, implementing a sanitation-only intervention, measured outcomes during the study period ("uptake") (Cameron et al., 2013). Handwashing after toilet use was measured, but no significant increase in handwashing could be demonstrated (Cameron et al., 20132013). Two experimental studies (Galiani et al., 2012/2015; Briceno et al., 2015), and one observational study, with a combined handwashing and water supply/quality intervention (Arnold et al., 2009), measured outcomes less than 12 months after the programme period ("adherence"), and some differences across these studies were found. In a study with moderate risk of bias (Briceno et al., 2015), for the outcome "handwashing before food handling" a significant effect was shown when implementing a handwashing intervention (MD 7.70, 95% CI [3.78, 11.62]), or a combined handwashing and sanitation intervention (MD 1.60, 95% CI [0.03, 3.17]), however results were not consistent when measured by observation or in a self-reported way (Briceno et al., 2015). In addition, this effect could not be shown in a second study with moderate risk of bias, implementing a community level or school level intervention (Galiani et al., 2012/2015). For "handwashing with water and soap prior to eating" a significant effect was shown in the case of a school level intervention (self-reported: MD 0.09, 95% CI [0.01, 0.18]; observation: MD 0.12, 95% CI [0.02, 0.21]) (Galiani et al., 2012/2015), but not for the community level intervention (Galiani et al., 2012/2015) or in the observational study (Arnold et al., 2009). Finally, no significant effect could be demonstrated for handwashing with soap during the period "the last 24 hours" (Briceno et al., 2015), or handwashing at other key times (before feeding a child, after faecal contact, before cooking, before eating, after changing baby) (Arnold et al., 2009; Briceno et al., 2015; Galiani et al., 2012/2015). The certainty of evidence was very low for the adherence outcomes (Table 28). No longer term outcomes were found in studies using social marketing approaches.

- Behaviour change: latrine use (Analysis 22). In one experimental study latrine use adherence was measured (Briceno et al., 2015). A significant effect on shared latrine use could not be demonstrated in the case of a handwashing intervention only (MD -3.1, 95% CI [-8.98, 2.78]), however in the case of a sanitation intervention, or a combined handwashing and sanitation intervention, a significant decrease of shared latrine use (indicating more private latrine use) was shown (MD -9.2, 95% CI [-14.49, -3.91] and MD -7.6, 95% CI [-70.90, -81.10] respectively) (Briceno et al., 2015). The certainty of evidence for this outcome was moderate (Table 29).

- Behaviour change: safe faeces disposal (Analysis 23). Only outcomes for the period “less than 12 months after the end of the implementation period” were measured (“adherence”). In an experimental study with moderate risk of bias, a positive effect was seen for the observation of faeces outside the latrine in the case of a combined handwashing and sanitation intervention (MD -4.3, 95% CI [-8.42, -0.18]), but not for the handwashing or sanitation intervention alone. A significant increase of safe child faeces disposal was seen in the case of a sanitation or combined intervention (MD 11.7, 95% CI [5.04, 18.36] and MD 8.4, 95% CI [1.93, 14.87] respectively)), but not for the handwashing intervention alone (MD 4.3, 95% CI [-2.76, 11,36]) (Briceno et al., 2015). No significant increase in safe faeces disposal could be demonstrated in an observational study with serious risk of bias where a handwashing and water supply/quality programme was implemented (RR 0.91, 95% CI [0.83, 1.01]) (Arnold et al., 2009). The certainty of evidence for these outcomes was very low (Table 30).

- Behaviour change: open defecation (Analysis 24). No statistically significant decrease of open defecation could be shown during the progam period (“uptake”) in an experimental study with low risk of bias, describing a sanitation-only intervention (RR 0.92, 95% CI [0.80, 1.05]) (Cameron et al., 2013). In case of a sanitation, or combined sanitation and handwashing intervention, a statistically significant decrease of people that always or regularly practice open defecation, and that usually defecate in fields, bushes or rivers, could be shown for the period less than 12 months after the end of the implementation (“adherence”), but not for the handwashing intervention alone (Briceno et al., 2015). The certainty of evidence for this outcome was found to be moderate (Table 31).

- Behavioural factors (Analysis 25). Three experimental (Cameron et al., 2013; Briceno et al., 2015; Galiani et al., 2012/2015), and one quasi-experimental study performed in schools (Pinfold, 1999), measured the effect of social marketing approaches on knowledge. In a study with low risk of bias (Cameron et al., 2013), no effect could be demonstrated concerning knowledge about causes of diarrhoea, and building of a latrine. In a study with a moderate risk of bias, a significant increase in the knowledge that “not washing hands with water and soap is the main cause of diarrhoea”, was seen for the community level intervention (Galiani et al., 2012/2015). A statistically significant increase in handwashing knowledge was reported in 3 studies (Pinfold, 1999; Briceno et al., 2015; Galiani et al., 2012/2015). In Briceno et al. (2015), only the combined handwashing and sanitation intervention led to improved knowledge concerning the best method to wash hands and when to wash hands. In Galiani et al. (2012/2015), this result was only seen in the school level intervention. In one study, the knowledge of the key events when handwashing was required, was tested, but no effect on this knowledge could be demonstrated as a result of the intervention (Galiani et al., 2012/2015). One study looked at skills, and more specifically at the practice of handwashing with one or both hands (Biran et al., 2009). An effect on washing one hand or both hands could not be demonstrated (RR 1.01, 95% CI [0.62, 1.64] and RR 0.70, 95% CI [0.48, 1.02] respectively) (Biran et al., 2009). A third behavioural factor, attitudes, was investigated in one experimental study with a low risk of bias (Cameron et al., 2013), but no effect on the attitude to open defecation could be demonstrated. The outcome “norms” was measured in one experimental

study (Briceno et al., 2015); the combined sanitation and handwashing intervention resulted in a significant decrease in the number of households that were aware of community members practicing open defecation (MD -6.6, 95% CI [-12.87, -0.033]), but this was not the case for the sanitation (MD -5.50, 95% CI [-11.18, 0.18]) or handwashing (MD -5.20, 95% CI [-10.88, 0.48]) intervention alone (Briceno et al., 2015).

- Health outcomes (Analysis 26). Morbidity outcomes were studied in three experimental (Cameron et al., 2013; Briceno et al., 2015; Galiani et al., 2012/2015) and one observational study (Arnold et al., 2009). An effect of the social marketing approach could not be shown for any diarrhoeal, and acute respiratory tract infection outcomes (Cameron et al., 2013; Briceno et al., 2015; Arnold et al., 2009; Galiani et al., 2012/2015).

- Influence of incentives in programs. From the 6 studies describing social marketing approaches, 2 studies described the use of incentives (see Table 3), including food (Arnold et al., 2009), and gifts (Biran et al., 2009) to the progam recipients. A third study compared two different promotional approaches, both with use of incentives, and is described below (Dickey et al., 2015). When focusing on these studies we found no significant effects on handwashing (adherence) and safe faeces disposal. When comparing the studies with or without use of incentives, there were no major differences.

4.3.1.4 Sanitation and hygiene messaging

Sanitation and hygiene messaging is a predominantly directive educational approach, consisting mainly of one-way communication, designed to help individuals and communities improve their health, by increasing their knowledge and/or skills. We identified an approach using sanitation and hygiene messaging as the major element of the promotional approach in 12 studies, of which 4 studies described school-based interventions (Abiola et al., 2012; Caruso et al., 2014; Lansdown et al., 2002; Pickering et al., 2013). All but one study had a handwashing component in the intervention (comparable to the social marketing approaches): eight studies described a handwashing-only intervention, with three of these also studying an intervention arm where handwashing was combined with either a water supply/quality or sanitation component. Six studies described a combined intervention (either handwashing with water supply/quality, handwashing with sanitation, or all three WASH components). One study included a sanitation-only intervention (see Figure 6).

Below we narratively describe the findings for the different outcome types. We specified the intervention if it was not focused on handwashing alone.

- Behaviour change: handwashing (Analysis 27-28). A significantly improved frequency of handwashing (MD 18.00, 95% CI [17.31, 18.69]) during the programme period (“uptake”) was shown in an experimental study (Kaewchana et al., 2012). In another experimental study, with a combined handwashing and sanitation intervention, a significant decrease was seen in washing hands only with water (MD -11.6%, $p<0.001$) (Mascie-Taylor et al., 2003). In addition, a statistically significant increase in handwashing with product after toilet use and before lunch was shown in the case of an educational intervention with hand sanitizer provision in schools

(Pickering et al., 2013). In the case of an educational intervention with soap in schools, a significant increase in "handwashing with soap" after toilet use (RR 18.66, 95% CI [11.58, 30.08]) was shown, but not in "any type of handwashing" (Pickering et al., 2013), meaning that handwashing already regularly occurred before the handwashing with soap intervention was implemented. A significant increase in "handwashing with soap" before lunch was also shown in the case of the soap intervention, but again not in "any type of handwashing" (RR 19.00, 95% CI [1.22, 295.91]) (Pickering et al., 2013). For "handwashing after toilet use" at less than 12 months after the programme period ("adherence") results were inconsistent (RR 1.15, 95% CI [1.05, 1.26]) (Abiola et al., 2012); RR 0.72, 95% CI [0.40, 1.31] (Yeager et al., 2002 (sanitation-only))), and for none of the other adherence outcomes a significant effect was demonstrated (Stanton & Clemens, 1987; Yeager et al., 2002; Abiola et al., 2012). For the uptake outcomes the certainty of evidence was found to be moderate and for the adherence outcomes it was low (Tables 32 and 33). Finally, two experimental studies, both with moderate risk of bias, measured longer-term outcomes (Bowen et al., 2013; Luby et al., 2009); in one study (Bowen et al., 2013) the handwashing intervention was combined with a water supply/quality component. No significant difference in handwashing with or with soap was shown in the first study (RR 1.00, 95% CI [0.97, 1.04]; RR 1.02, 95% CI [0.99, 1.06]) (Luby et al., 2009). However, in the second study the promotional approach had a positive effect on 9 out of 14 "handwashing at key times" outcomes (Bowen et al., 2013). The certainty of evidence for the longer-term outcomes was low (Table 34).

- Behaviour change: latrine use (Analysis 29). Latrine use was measured in one experimental study, less than 12 months following the end of the study period ("adherence") (Caruso et al., 2014). No statistically significant difference in latrine use was shown in this study (handwashing intervention: MD 1.80, 95% CI [-0.17, 3.77], latrine cleaning + handwashing intervention: MD -1.00, 95% CI [-2.91, 0.91]) (Caruso et al., 2014). The certainty of evidence for this outcome was found to be very low (Table 35).

- Behaviour change: safe faeces disposal (Analysis 30). In one experimental study, with a moderate risk of bias, describing a sanitation-only intervention, a statistically significant increase in "no child faeces on the ground" was shown (RR 1.68, 95% CI [1.21, 2.32]), but an effect on "safe child faeces disposal" could not be demonstrated, in the period less than 12 months after the end of the study period ("adherence") (RR 1.07, 95% CI [0.70, 1.65]) (Yeager et al., 2002). The certainty of evidence for this outcome was assessed to be low (Table 36).

- Behaviour change: open defecation (Analysis 31). A significant effect of an education approach on open defecation in a short term ("uptake") and less than 12 months after project implementation ("adherence") could not be demonstrated in 3 experimental studies, all with moderate risk of bias (Lansdown et al., 2002; Wang et al., 2013; Stanton & Clemens, 1987). All studies had an intervention with a handwashing and sanitation component, and in 2 of the 3 also a water supply/quality component was included. The certainty of evidence for both the uptake and adherence outcomes was assessed as low (Tables 37 and 38).

- Behavioural factors (Analysis 32). Knowledge was measured in 3 experimental (Lansdown et al., 2002; Mascie-Taylor et al., 2003; Abiola et al., 2012) and one observational study (Seimetz

et al., 2016). In one study an effect of the school-based educational intervention on knowledge could not be demonstrated 9 months after the start of the intervention, however a statistically significant increase in knowledge (health causation and prevention) was measured 15 months after the end of the implementation (MD 2.71, 95% CI [0.36, 5.06]) (Lansdown et al., 2002). In a second study, no effect on perceived vulnerability, severity, or health knowledge was shown (Seimetz 2016). In Mascie-Taylor et al. (2003), the percent difference in knowledge from baseline to 18 months between intervention and control was calculated. The promotional intervention improved the level of health knowledge regarding whether worms are good for health (MD 31.1%, $p<0.001$), whether defecation in the courtyard is associated with worms (MD 68.2%, $p<0.001$), whether defecation in the bushes is associated with worms (MD 58.1%, $p<0.001$), and whether removal of all worms is good for a person (MD 54.7%, $p<0.001$). In Abiola et al. (2012) a significant increase in knowledge about the meaning of personal hygiene (RR 1.16, 95% CI [1.06, 1.27]), and eating with unclean hands as the cause of diarrhoea (RR 1.65, 95% CI [1.31, 2.08]) was shown after implementing a school-based intervention, but not for 2 other outcomes on personal hygiene knowledge. Next, three studies also measured skills (Bowen et al., 2013; Luby et al., 2009; Seimetz et al., 2016). In two of the studies (Bowen et al., 2013; Luby 2009) a statistically significant increase in using soap for handwashing (handwashing skills) was shown (RR 1.05, 95% CI [1.02, 1.08], see pooled value in Analysis 10). Also a significant increase in "rubbing hands together at least 3 times" (skills) and "lathering hands for at least 10 seconds" was shown. For "drying hands with a clean towel" a significant effect could not be shown in 2 of the 4 intervention arms (Bowen et al., 2013; Luby et al., 2009). In Seimetz et al. (2016), no difference in maintenance self-efficacy (confidence in abilities to maintain the behaviour) and recovery self-efficacy (confidence in abilities to successfully return to the behaviour) could be demonstrated, and, surprisingly, a decrease in action self-efficacy, which is the confidence in the abilities to successfully perform the behaviour, was shown (MD -0.20, 95% CI [-0.31, -0.09]). Finally, attitude outcomes were measured in two studies (Seimetz et al., 2016; Abiola et al., 2012), however the effect of sanitation and hygiene messaging on the majority of the outcomes could not be demonstrated (beliefs about costs, belief that the behaviour will lead to the outcome (response), feelings of liking washing hands, feelings of dirtiness when not washing hands, necessity to wash hands after going to the toilet, willingness to recommend practice of personal hygiene to friends), except for feelings of attractiveness when using soap to wash hands, which was significantly decreased (MD -0.27, 95% CI [-0.48, -0.06]). Seimetz et al. (2016) also measured "norms" and "self-regulation", but no significant effects were demonstrated except a significant decrease in action control ("self-regulation"), the determination to execute and control the behaviour, was shown.

- Health outcomes. Health outcomes were not measured in studies using sanitation and hygiene messaging approaches.

- Influence of incentives in programs. From the 12 studies describing sanitation and hygiene messaging, only one study described the use of incentives (see Table 3), which was the provision of soap bars to the programme recipients (Seimetz et al., 2016). This study only reported outcomes such as skills, attitude and self-regulation and could not show any

improvement of these outcomes. No difference were shown in these outcomes when in- or excluding this study making use of soap bars as incentives.

4.3.1.5 Elements of psychosocial theory

The 4 studies that we included in this category all described theoretical elements or a formal psychosocial theory as the basis of the intervention. One study used the Theory of Planned Behaviour (Langford et al., 2013) and one study the RANAS model (Tumwebaze & Mosler, 2015). Biran et al. (2014) describes the SuperAmma approach, based on emotional drivers of behaviour, and Luby et al. (2010) describes an approach based on the stages of change theory. It should be noted that all these studies were conducted at small scale, and that elements of psychosocial theory should be incorporated in a larger promotional approach for a programme at scale. All studies implemented a handwashing-only intervention (see Figure 6).

Below we narratively describe the findings for the different outcome types.

- Behaviour change: handwashing (Analysis 33). Two different experimental studies describing interventions based on elements of psychosocial theory, measured handwashing at key times during the study period ("uptake") (Langford & Panter-Brick, 2013; Luby et al., 2010). The study by Luby et al. (2010) had two different intervention arms, one with a theory-based intervention with soap, and one with a theory-based intervention with hand sanitizer. A significant effect on handwashing at different key times could be shown for 7 of the 9 outcomes (excluding the programme with hand sanitizer) (Langford & Panter-Brick, 2013; Luby et al., 2010). For the hand sanitizer intervention, a significant effect for handwashing in 3 out of 10 key times was shown (Luby et al., 2010). The certainty of evidence for the uptake outcomes was found to be low (Table 39). In one experimental study, with a low risk of bias, adherence outcomes were measured (Biran et al., 2014). Handwashing at key times was significantly improved, both at 6 weeks (MD 15.00, 95% CI [10.71, 19.29]) and 6 months (MD 31.00, 95% CI [29.45, 32.55]). For the adherence outcomes, the certainty of evidence was moderate (Table 40).

- Behavioural factors (Analysis 34). One experimental study with moderate risk of bias measured knowledge, skills and attitudes (Tumwebaze & Mosler, 2015). An effect on knowledge about disease severity (MD 0.09, 95% CI [-0.06, 0.24]) and knowledge about disease vulnerability (MD 0.02, 95% CI [-0.05, 0.09]) could not be demonstrated. An additional public commitment element in the promotional approach also did not result in any significantly improved outcomes. An intervention based on elements of psychosocial theory improved skills in cooperation confidence in both treatment arms (MD 0.44, 95% CI [0.06, 0.82]; MD 0.42, 95% CI [0.06, 0.78]), but improved skills in cleaning ease (confidence in the ability to participate in cleaning a shared sanitation facility) and using a cleaning roster (planning showing who is responsible for cleaning at a certain time point) could not be demonstrated. Finally, no differences in attitudes regarding time cost, cleaning affect and cleaning effort could be shown in any of the treatment arms (Tumwebaze & Mosler, 2015).

- Health outcomes. Langford et al. (2013) measured morbidity outcomes. The intervention based on elements of psychosocial theory significantly reduced the "median days of diarrhoea" from 16.3 to 9.7 (intervention vs controls, n=88, p=0.023).

- Influence of incentives in programs. From the 4 studies describing elements of psychosocial theory, only one study described the use of incentives (see Table 3), which was the provision of soap bars to the programme recipients (Langford & Panter-Brick, 2013). This study found a significant increase in handwashing at the short term, however absolute effects were similar as with the studies not using incentives.

4.3.2 Comparison of different promotional approaches

In 7 studies, certain promotional approaches were compared with one another. In this way, the effect of specific additional elements to a promotional approach could be studied. We discuss the different comparisons below (Contzen et al., 2015a/2015b; Dickey et al., 2015; Graves et al., 2011; Guiteras et al., 2015a; Lhakhang et al., 2015; Whaley & Webster, 2011; Zhang et al., 2013).

An overview of the findings on studies comparing different communication strategies is given in Table 41 and described in detail below.

Table 41: Overview of the findings on studies comparing different promotional approaches

Study	Intervention	Control	Outcome	MD/RR, [95% CI]
Contzen et al., 2015a/ 2015b	A combination of: + Infrastructure promotion + Reminder + Hygiene messaging	Hygiene messaging	Stool-related handwashing	MD 0.20, [0.04, 0.36]*
			Food-related handwashing	MD 0.21, [0.06, 0.36]*
	A combination of: + Public commitment + Reminder + Education	Hygiene messaging	Stool-related handwashing	MD 0.09, [-0.07, 0.25]
			Food-related handwashing	MD 0.08, [-0.07, 0.23]
	A combination of: + Infrastructure promotion + Public commitment + Reminder + Hygiene messaging	Hygiene messaging	Stool-related handwashing	MD 0.27, [0.11, 0.43]*
			Food-related handwashing	MD 0.32, [0.17, 0.47]*
Dickey et al., 2015	Local-builder social marketing approach	Outside-expert building team approach	Number of households refusing to use the new toilet	RR 0.02, [0.00, 0.31]*
Graves et al., 2011	A combination of: + Poster contest + Hygiene messaging	Hygiene messaging	Number of pupils washing hands after 4 months	MD 0.08, [-0.19, 0.35]
			Change in handwashing after 4 months	MD 0.06, [-0.36, 0.48]

Guiteras et al., 2015a	Hygiene messaging with elements of disgust	Hygiene messaging	Handwashing after last defecation	
			3.5 months	RR 1.00, [0.95, 1.07]
			7 months	RR 0.98, [0.92, 1.05]
			Handwashing all 3 key times	
			3.5 months	RR 1.39, [0.89, 2.15]
			7 months	RR 1.27, [0.86, 1.88]
			Feeling of disgust when hands are not washed with soap	
			3.5 months	RR 0.99, [0.96, 1.01]
			7 months	RR 1.00, [0.99, 1.01]
			Knowing all 3 key times for handwashing with soap	
			3.5 months	RR 1.38, [1.01, 1.68]
			7 months	RR 3.38, [2.24, 5.11]
			Knowledge about “other key times”	
			3.5 months	RR 1.30, [0.35, 4.78]
			7 months	RR 3.09, [1.42, 6.76]
			Knowledge about “after defecation” as usual time to wash hands with soap	
			3.5 months	RR 1.03, [0.99, 1.07]
			7 months	RR 0.99, [0.95, 1.03]
Lhakhang et al., 2015	Motivational intervention followed by self-regulatory intervention	Self-regulatory intervention followed by motivational intervention	Handwashing	MD 0.09, [-0.18, 0.37]
			Intention	MD -0.80, [-1.09, -0.52]
			Self-efficacy	MD -0.16, [-0.44, 0.11]
			Planning	MD 0.31, [0.03, 0.59]*
	Motivational intervention	Self-regulatory intervention	Handwashing	MD -0.78, [-1.07, -0.5]
			Self-efficacy	MD -0.83, [-1.12, -0.55]
			Planning	MD -1.71, [-2.03, -1.39]
Whaley & Webster	Community Health Clubs	Community-Based Total Sanitation	Latrine use	
			After 6 months	RR 0.96, [0.74, 1.25]
			After 2 years	RR 2.20, [0.97, 5.01]
			Open faecal disposal	
			After 6 months	RR 1.19, [1.00, 1.42]
			After 2 years	RR 1.04, [0.96, 1.12]

Zhang et al., 2013	A combination of: + Infrastructure promotion + Hygiene messaging	Hygiene messaging	Handwashing	RR 8.48, [5.31, 13.55]*
			Handwashing when using the toilet	RR 4.19, [3.08, 5.71]*
			Handwashing with soap	RR 6.50, [4.15, 10.19]*

All mean differences and risk ratios are presented as Cochran-Mantel-Haenszel estimate, [95% CI]. MD: Mean difference; RR: risk ratio; CI: Confidence interval. *p<0.05

4.3.2.1 Hygiene messaging and elements of psychosocial theory versus hygiene messaging alone

In Contzen et al. (2015a/2015b) three intervention arms were compared (Analysis 35). A health education approach (hygiene messaging) based on psychosocial theories (elements of infrastructure promotion, public commitment, reminders) was compared with health education (hygiene messaging) alone, and only handwashing was included in the intervention. In one intervention arm, education was combined with infrastructure promotion and reminder, in another intervention arm, education was combined with a focus on public commitment and reminder, and in a third arm, both elements were included. These 3 intervention arms were compared with a control arm, consisting of health education alone. A statistically significant increase of stool-related and food-related handwashing were shown in case of using the infrastructure promotion (stool-related: MD 0.20, 95% CI [0.04, 0.36]; food-related: MD 0.21, 95%CI [0.06, 0.36]) or the combined infrastructure promotion and public commitment (stool-related: MD 0.27, 95% CI [0.11, 0.43]; food-related: MD 0.32, 95% CI [0.17, 0.47]) interventions, however in case of a programme only using public commitment this could not be demonstrated (stool-related: MD 0.09, 95% CI -0.07, 0.25]; food-related: MD 0.08, 95% CI [-0.07, 0.23]).

In addition, several behavioural factors were also measured in this study. A statistically significant correlation was shown between the educational approach together with infrastructure promotion, public commitment and reminder, and the following behavioural factors, regarding changes in food- and stool-related handwashing: descriptive norm (correlation coefficient food-related handwashing: 0.87; stool-related handwashing: 1.05), injunctive norm (correlation coefficient food-related handwashing: 0.65; stool-related handwashing: 0.60), commitment strength (correlation coefficient food-related handwashing: 0.53), forgetting (correlation coefficient food-related handwashing: -0.66; stool-related handwashing: -0.66), motivational self-efficacy (belief in ability to initiate and execute the behaviour) (correlation coefficient food-related handwashing: 0.47; stool-related handwashing: 0.54), volitional self-efficacy (belief in ability to maintain the behaviour) (correlation coefficient food-related handwashing: 0.44; stool-related handwashing: 0.44) and impediments (anticipated barriers and distractions to a behaviour) (correlation coefficient food-related handwashing: -0.49; stool-related handwashing: -0.49). For the educational intervention with infrastructure promotion, a significant correlation was found for most of the behavioural factors, while for the educational intervention with public commitment, significant correlations could only be found for less than half of the factors studied.

4.3.2.2 Local-builder social marketing approach versus outside-expert building team approach

The comparison between a local-builder social marketing approach versus an outside-expert building team approach was made in a study published in 2015, implementing a sanitation intervention (Dickey et al., 2015). The local-builder social marketing approach resulted in a statistically significant decrease in the number of households refusing to use the new toilet (RR 0.02, 95% CI [0.00, 0.31]).

4.3.2.3 Hygiene messaging with poster contest versus hygiene messaging alone

In the study by Graves et al. (2011), the effect of an additional communication strategy (poster contest), in addition to an existing educational intervention (hygiene messaging), was tested in Kenyan primary schools where a handwashing intervention was implemented. A statistically significant increase in handwashing after 4 months (MD 0.08, 95% CI [-0.19, 0.35]), and a significant change after 4 months (MD 0.06, 95% CI [-0.36, 0.48]) when the additional poster contest was organized, could not be demonstrated.

4.3.2.4 Hygiene messaging with elements of disgust versus hygiene messaging alone

Guiteras et al. (2015a) measured the effect of focusing on “disgust” in an educational intervention (hygiene messaging) in urban Dhaka, Bangladesh, implementing a handwashing and water supply/quality intervention (Analyses 36-37). The educational intervention was embedded in a broader intervention consisting of infrastructure promotion, a free trial of water treatment and handwashing hardware (chlorine dispenser), reminder visits, sales coaching and a sales offer (giving the opportunity to purchase hardware for a fee). Using additional elements of disgust in an educational approach did not result in an increase of handwashing after last defecation at 3.5 and 7 months (RR 1.00, 95% CI [0.95, 1.07]; RR 0.98, 95% CI [0.92, 1.05]), and at all 3 key times at 3.5 and 7 months (RR 1.39, 95%CI [0.89, 2.15); RR 1.27, 95% CI [0.86, 1.88]). No significant effect on the feeling of disgust when hands are not washed with soap could be demonstrated at 3,5 (RR 0.99, 95% CI [0.96, 1.01]), and 7 months (RR 1.00, 95% CI [0.99, 1.01]). This study also measured knowledge concerning “usual times to wash hands with soap”: a significant increase of knowing all 3 key times for handwashing with soap was shown at 3.5 months (RR 1.38, 95% CI [1.01, 1.68]) and 7 months (RR 3.38, 95% CI [2.24, 5.11]) follow-up. At 7 months, the knowledge about “other key times” also significantly increased (RR 3.09, 95% CI [1.42, 6.76]), however an effect on knowledge about “after defecation” as usual time to wash hands with soap could not be demonstrated (Guiteras et al., 2015a).

4.3.2.5 Elements of psychosocial theory: motivational intervention followed by self-regulatory intervention versus self-regulatory intervention followed by motivational intervention

Lhakhang et al. (2015) implemented a handwashing intervention, and compared a group that received a motivational intervention followed by a self-regulatory intervention 17 days later, with a

group that received the same two intervention modules in the opposite order. No statistically significant overall difference in handwashing was found between the 2 different programmes (MD 0.09, 95% CI [-0.18, 0.37]). However, when only the first intervention was implemented, a statistically significantly higher degree of handwashing was shown in the group that received the self-regulatory intervention compared with the group that received the motivational intervention (MD -0.78, 95% CI [-1.07, -0.5]). For "intention", after introducing both programme elements, a statistically significantly higher degree of intention was measured for the group that first received self-regulatory elements followed by motivational elements (MD -0.80, 95% CI [-1.09, -0.52]). For "self-efficacy", a higher degree of self-efficacy was found after receiving only the self-regulatory intervention, compared to the group that only received the motivational intervention (MD -0.83, 95% CI [-1.12, -0.55]), but after receiving both elements the significant difference disappeared (MD -0.16, 95% CI [-0.44, 0.11]). For "planning", again the group only receiving the self-regulatory intervention showed significantly better results (MD -1.71, 95% CI [-2.03, -1.39]), but after receiving both elements of the intervention, the group that first received motivational and then self-regulatory elements scored significantly better (MD 0.31, 95% CI [0.03, 0.59]).

4.3.2.6 Community Health Clubs versus Community-Based Total Sanitation

Whaley & Webster (2011) compared two different types of community-based approaches, Community Health Clubs versus Community-Based Total Sanitation. Both interventions contained all WASH components. No significant difference in latrine use could be demonstrated between the two approaches, 6 months and 2 years after the start of the programme (RR 0.96, 95% CI [0.74, 1.25] and RR 2.20, 95% CI [0.97, 5.01]). In addition, no difference in open faecal disposal could be shown, 6 months and 2 years after the start of the programme (RR 1.19, 95% CI [1.00, 1.42] and RR 1.04, 95% CI [0.96, 1.12]).

4.3.2.7 Hygiene messaging and infrastructure promotion versus hygiene messaging alone

Zhang et al. (2013), measured the effect of adding an infrastructure promotional component to a school-based educational intervention focused on handwashing (hygiene messaging). A statistically significant improvement in handwashing (RR 8.48, 95% CI [5.31, 13.55]), handwashing when using the toilet (RR 4.19, 95% CI [3.08, 5.71]), and handwashing with soap (RR 6.50, 95% CI [4.15, 10.19]) could be demonstrated, as a result of implementing an infrastructure promotional component.

4.3.3 Effect of different communication strategies

An overview of the findings on studies comparing different communication strategies is given in Table 42 and described in detail below.

4.3.3.1 Mass media and interpersonal communication versus mass media alone

Only in one experimental study, with a moderate risk of bias, two types of communication strategies were compared (Chase & Do, 2012). The programme in the study focused on handwashing and was based on psychosocial theory (based on the FOAM framework), and a

combination of mass media and interpersonal communication activities was compared with mass media alone.

Table 42: Overview of the findings on studies comparing different communication strategies

Study	Intervention	Control	Outcome	MD, [95% CI]
Chase & Do, 2012	A combination of: + Mass media + Interpersonal communication	Mass media	Handwashing with soap	
			Adherence	0.01, [0.01, 0.01] *
			After fecal contact	0.01, [0.01, 0.01] *
			Before food preparation	0.04, [0.03, 0.04] *
			Before (breast)feeding child	0.03, [0.03, 0.03] *
			Before eating	-0.01, [-0.01, -0.00] *
			Because hands look/feel dirty	0.02, [0.02, 0.02] *
			After/while doing laundry	0.00, [0.00, 0.00]
			Diarrhoea	-0.02, [-0.02, -0.02] *
			Acute respiratory infection	-0.04, [-0.05, -0.04] *
Galiani et al., 2012, 2015	A combination of: + Mass media + direct consumer contact	No promotional approach	Handwashing (adherence)	
			After fecal contact	-0.08, [-0.16, -0.01] *
			Prior to eating	-0.16, [-0.23, -0.08] *
			Before feeding a child	0.037, [-0.02, 0.1]
			Before food preparation	-0.007, [-0.08, 0.07]
			Knowledge on	
			Best method to wash hands	-0.003, [-0.04, 0.04]
			Events that require handwashing	0.02, [-0.02, 0.06]
			Not washing hands as cause of diarrhoea	-0.006, [-0.03, 0.02]
			Diarrhoea in children <5 yrs	
			Recall period 2 days	0.01, [-0.02, 0.04]
			Recall period 7 days	0.011, [-0.02, 0.05]
			Acute lower respiratory infections <5 yrs	
			Recall period 2 days	-0.039, [-0.07, -0.01] *
			Recall period 7 days	-0.047, [-0.08, -0.01] *

All mean differences are presented as Cochran-Mantel-Haenszel estimate, [95% CI]. MD: Mean difference; CI: Confidence interval; yrs: years. *p<0.05

The additional component of interpersonal communication resulted in a statistically significant increase in handwashing, less than 12 months after the programme period ("adherence") (MD 0.01, 95% CI [0.01, 0.01]) (Analysis 38). In addition, an increase in handwashing at different key times (after faecal contact, before food preparation, before (breast) feeding a child, when hands look or

feel dirty) was measured. An increase in “handwashing while doing laundry” could not be demonstrated, and, surprisingly, a significant decrease in “handwashing before eating” was measured (Chase & Do, 2012) (Analysis 39). Finally, a significant decrease in diarrhoea (MD -0.02, 95% CI [-0.02, -0.02]), and acute respiratory tract infection (MD -0.04, 95% CI [-0.05, -0.04]) was shown when using additional interpersonal communication activities (Chase & Do, 2012) (Analysis 40).

4.3.3.2 Mass media and direct consumer contact versus no promotional approach

One study, using a social marketing approach to implement a handwashing intervention, compared a mass media campaign with direct consumer contact (province level intervention) to not using a promotional approach (Galiani et al., 2012/2015). In the intervention arm with only the mass media and direct consumer contact results were mixed (Analyses 41-43): surprisingly a significant decrease in handwashing at two different key times, in the period less than 12 months after the end of the implementation (“adherence”) (after faecal contact: MD -0.08, 95% CI [-0.16, -0.01]; prior to eating: MD -0.16, 95% CI [-0.23, -0.08]) was shown, and an effect in handwashing at two other key times could not be demonstrated (before feeding a child: MD 0.037, 95% CI [-0.02, 0.1]; before food preparation: MD -0.007, 95%CI [-0.08, 0.07]). In addition, an effect on knowledge of the best method to wash hands (MD -0.003, 95% CI [-0.04, 0.04]), of the events that require handwashing (MD 0.02, 95% CI [-0.02, 0.06]) and about not washing hands as the cause of diarrhoea (MD -0.006, 95% CI [-0.03, 0.02]) could also not be demonstrated. Finally, an effect on diarrhoea in children under five years was not shown (recall period 2 days: MD 0.01, 95% CI [-0.02, 0.04]; recall period 7 days: MD 0.011, 95% CI [-0.02, 0.05]), however a significant decrease of acute lower respiratory infections in children under five years was found (recall period 2 days: MD -0.039, 95% CI [-0.07, -0.01]; recall period 7 days: MD -0.047, 95% CI [-0.08, -0.01]) (Galiani et al., 2012/2015).

In a second intervention arm, elements of community involvement were added to the mass media intervention. Results are described in paragraph 4.3.1.3. It can be concluded that for handwashing (only at school level) and knowledge more effect was reached when the community was involved.

5 Results: Factors influencing implementation

5.1 DESCRIPTION OF STUDIES

5.1.1 Results of the search

The identification of qualitative studies was performed in parallel with the identification of quantitative studies, since the same search strategy was used. Therefore, full text screening of 400 records, as described in 4.1.1, also resulted in a number of qualitative studies. We finally identified 28 qualitative studies, of which 24 were found through database searching (19 qualitative studies and 5 mixed-methods studies) and 4 from the grey literature. In addition, 5 mixed-methods studies were identified, as described above. The study selection flowchart is depicted in Figure 3 (see 4.1.1).

5.1.2 Included studies (n=28)

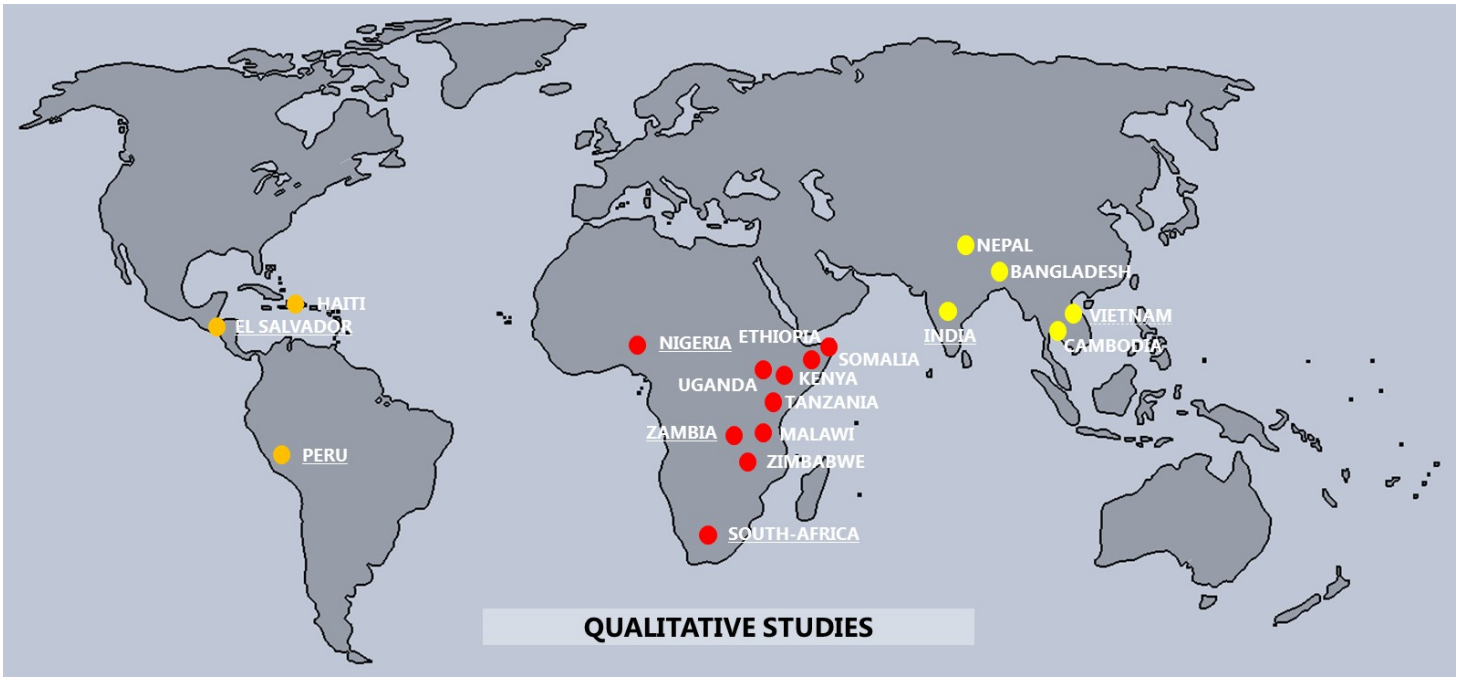
An overview of the characteristics of the included qualitative studies can be found in Table 43. The majority of the studies (n=19, 68%) was published in the last 5 years, with only 9 studies published between 2002 and 2011.

- Countries (see Figure 12)

Most of the studies (n=15, 53%) were performed in Sub-Saharan Africa (Kenya (n=3), Tanzania (n=3), Zimbabwe (n=2), Nigeria (n=1), Ethiopia (n=1), Malawi (n=1), Uganda (n=1), Zambia (n=1), Somalia (n=1) and South Africa (n=1)). Ten studies (36%) were performed in Asia: 7 studies in South Asia (Bangladesh (n=3), India (n=3) and Nepal (n=1) and 3 studies in South-East Asia (Vietnam (n=2) and Cambodia (n=1)). Only 4 studies (11%) were conducted in Latin America and the Caribbean (El Salvador (n=1), Haiti (n=1) and Peru (n=1)).

Considering country income at the time the studies were performed, 19 studies (68%) were conducted in low-income countries (Bangladesh, Cambodia, Ethiopia, Haïti, Kenya, Malawi, Nepal, Somalia, Tanzania, Uganda, Vietnam (until 2008) and Zimbabwe) and 9 studies (34%) in lower middle-income countries (El Salvador, India, Nigeria, Peru, South Africa, Vietnam (from 2009) and Zambia).

Figure 12. World map indicating in which countries the included qualitative studies were performed.



Adapted from © 2009 www.outline-world-map.com

Underlined countries, full line: country was a middle income country when the study was performed.

Underlined countries, dotted line: country was a low or middle income country when the study was performed.

Orange: Central America and Latin America; Red: Sub-Saharan Africa; Yellow: South Asia, South-East Asia and Oceania.

- Setting and target level

Most (68%) of the studies were executed in a rural setting (n=19), 3 studies (11%) were performed in an urban setting, 2 studies (7%) were executed in both a rural and urban setting and 3 studies (11%) were performed in an informal-rural setting (i.e. slums, settlements). One study (3%) did not provide any information about the setting in which the study was conducted. The intervention was targeted at a community level in 22 studies (12 on a community level, 4 on a (sub-)district level, 2 on a household level, 2 on a village level, 1 on a compound level and 1 on a county level) and at a school level in 3 studies. Two studies investigated interventions on both a school level and a community level (n=1) or village level (n=1). One study did not provide any information about the target level in which the study was conducted.

- WASH components

The following (combination of) WASH components were present in the interventions: WASH (general) in 11 studies, sanitation only in 9 studies, handwashing only in 4 studies, handwashing/sanitation in 1 study, handwashing/sanitation/water supply in 1 study, and handwashing/sanitation/hygiene/water quality in 1 study.

- Promotional approach

We classified the promotional approaches in 4 main groups according to the same criteria used for the quantitative studies (see 4.1.2: promotional approach). The approach in 18 studies (64%) was considered as a community-based approach, a social marketing approach in 2 studies, sanitation and hygiene messaging in 5 studies, and the intervention was based on elements of psychosocial theory in 3 studies. Table 44 shows which studies were grouped under each category, and Figure 13 in addition also provides the WASH component of each study.

Table 44: List of included qualitative studies in each of the 4 categories of promotional approaches

Community-based approach	Social marketing approach	Sanitation and hygiene messaging	Elements of psychosocial theory
Adeyeye (2011)	Cole et al. (2015)	Graves et al. (2013)	Hulland et al. (2013)
Akter (2014)	Emerging Markets Consulting (2014)	Lansdown et al. (2002)	Langford et al. (2013)
Andrade (2013)		O'Donnell (2015)	Rajaraman et al. (2014)
Brooks et al. (2015)		Xuan et al. (2013)	
Bruck and Dinku (2008)		Yeager et al. (2002)	
Hueso and Bell (2013)			
Jimenez et al. (2014)			
Katsi (2008)			
Kiwanuka et al. (2015)			
Lawrence et al. (2016)			
Malebo et al. (2012)			
Pardeshi (2009)			
Rheinlander et al. (2012)			
Sarker and Panday (2007)			
Schouten and Mathenge (2010)			
Silali et al. (2014)			
Smith et al. (2004)			
Whaley & Webster (2011)			

5.1.3 Excluded studies

Since study selection was performed in parallel for both the quantitative and qualitative studies, the main reason for exclusion of papers is described for both study types in paragraph 4.1.3. Detailed information can be found in Appendix 9 (List of excluded database studies) and 10 (List of excluded grey literature studies), and the reference list of excluded studies.

5.2 QUALITY ASSESSMENT OF INCLUDED STUDIES

We appraised the quality of each study according to the 10 items of the Critical Appraisal Skills Programme (CASP) tool (see Figure 14).

Figure 14: Quality assessment of qualitative studies using CASP checklist

Study ID	Aim of the research (item 1)	Qualitative methodology appropriate? (item 2)	Research design appropriate? (item 3)	Recruitment strategy appropriate? (item 4)	Data collection appropriate? (item 5)	Relationship researcher - participants? (item 6)	Ethical issues? (item 7)	Rigorous data analysis? (item 8)	Clear statement of findings? (item 9)	Research valuable? (item 10)	Overall score
Andrade, 2013											10/10
Cole et al., 2015											10/10
Graves et al., 2013											10/10
Hulland et al., 2013											10/10
Jimenez et al., 2014											10/10
Kiwanuka et al., 2015											10/10
Lawrence et al., 2016											10/10
Rajaraman et al., 2014											10/10
Rheinländer et al., 2012											10/10
Whaley & Webster, 2011											10/10
Xuan et al., 2013											10/10
Yeager et al., 2002											4/10
Katsi, 2008											6/10
Schouten & Mathenge, 2010											6/10
Adeyeye, 2011											7/10
O'Donnell, 2015											7/10
Sarker & Panday, 2007											7/10
Bruck & Dinku, 2008											8/10
Emerging Markets Consulting, 2014											8/10
Akter & Ali, 2014											9/10
Brooks et al., 2015											9/10
Hueso & Bell, 2013											9/10
Langford & Panter-Brick, 2013											9/10
Lansdown et al., 2002											9/10
Malebo et al., 2012											9/10
Pardeshi, 2009											9/10
Silali & Njambi, 2014											9/10
Smith et al., 2014											9/10

green: yes; yellow: no information; red: no

All studies provided clear statements of the research aims (item 1). The use of qualitative methodology (item 2), the qualitative research design that was used (item 3), the recruitment strategy (item 4) and the data collection techniques (item 5) were considered as appropriate in almost all studies. A clear statement of findings (item 9) was present in 26 studies (93%) and the research was considered as a valuable contribution (item 10) in 25 studies (89%). The relationship between researcher and participants was adequately considered in 17 studies (61%), which was evidenced via member checking or matching demographic variables between interviewer and target group. Ethical issues were explicitly considered in 18 studies (64%) and the data analysis was sufficiently rigorous in 21 studies (75%).

5.3 SYNTHESIS OF RESULTS

The term 'category' was used as an umbrella term to define the overall process and implementation issues, namely the process evaluation factors, the programme environment factors and the recipient/implementer-related (contextual) factors. Specific factors in these categories (e.g. acceptability as a process evaluation factor or demographic variables as a personal contextual factor) were defined as 'themes' and barriers/facilitators related to these themes were called 'factors'.

For many of the factors we describe below, we make the distinction between implementer-related factors and recipient-related factors. Because often community members are also involved in the implementation of a programme, they can be the implementer and recipient at the same time. For the description below we defined the implementer as: (1) the organization, NGO or funding body that is the primary implementer of the approach, or (2) a change agent, health promoter or member of the community involved in the implementation as a secondary implementer. A recipient is defined as a member of a household, a villager, or trainee, receiving the promotional approach.

5.3.1 Process evaluation factors

Barriers/facilitators related to almost all (7/9) pre-identified process evaluation themes (acceptability, dose, engagement, fidelity, reach and satisfaction) were extracted from the qualitative studies. No information was available for 2 factors: recruitment and attrition. An overview of all barriers and facilitators identified can be found in Table 45 and Appendix 11.

- Acceptability

Acceptability refers to the quality or state of meeting one's needs adequately. Evidence from 3 studies identified recipients not willing to change their **habits** (Andrade, 2013), the **mind-set** of communities to demand free or subsidized materials (Malebo et al., 2012), and the possible **safety risk** of activities for children on the street (Rajaraman et al., 2014) as potential barriers. Household interviewees from 1 Indian study about a rural handwashing with soap programme (Rajaraman et al., 2014) indicated an intervention team being **polite** and **entertaining** and **cooperation** of the intervention team with the villagers as positive factors (facilitators) for making the handwashing programme more acceptable.

- Dose

Dose refers to the content, frequency, duration and coverage of the programme. Several of the included studies identified the following barriers related to dose of the programme: the messages are **too long** (O'Donnell, 2015 and Rajaraman et al., 2014), **short programme duration** (Bruck & Dinku, 2008), a **lack of follow-up** by the implementers (Malebo et al., 2012 and Whaley & Webster, 2011) or giving recipients only **verbal information**. Interventions of **longer duration** (Xuan et al., 2013), **relevant messages** (Andrade, 2013), **frequent and external visits** by the implementers or health promoters (Langford & Panter-Brick, 2013; Andrade, 2013; Whaley & Webster, 2011) and a **broad/detailed** (Whaley & Webster, 2011), **step-wise** approach (Andrade, 2013) were considered as potential facilitators.

- Engagement

Engagement refers to the subjective attributes that define the recipient's participation in interaction with or receptivity to an intervention. It also refers to the subjective attributes of programme staff that can influence their capacity to deliver intervention strategies (Cargo et al., 2015). The following barriers at the level of the implementer and related to recipient engagement were found: **lack of follow-up** by the implementers (Whaley & Webster, 2011), **lack of communication** (Emerging Markets Consulting, 2014), **overlap with other programmes** (Lawrence et al., 2016), the **personal career** of the implementer (Hueso & Bell, 2013), and **lack of enthusiasm** from outside experts (Lansdown et al., 2002). We also identified barriers at the level of the recipient: **lack of interest** from the recipients (Xuan et al., 2013), and not willing to give up **unhealthy habits** (Akter & Ali, 2014).

People from the interviews or focus group discussions also indicated several positive factors (facilitators) at the level of the implementer, including **enthusiasm** of the members of the Village Development Committees (Sarker & Panday, 2007 and Smith et al., 2004) and leadership of the implementer (Pardeshi, 2009). In addition, the following facilitators at the level of the recipient were found: **income generating activities** for participants of the health club (Whaley & Webster, 2011), and the **praise** and recognition of having a pretty home (Andrade, 2013).

- Fidelity

Fidelity reflects the extent to which an intervention is implemented as originally intended by programme developers (Cargo et al., 2015). One school-based study conducted in India suggested that **school closures** can act as a barrier to the fidelity of the programme (Rajaraman et al., 2014).

- Reach

Reach refers to the degree to which the intended audience participates in an intervention by 'their presence' (Cargo et al., 2015). In at least one study with a primarily social marketing approach, the **small scale** of the intervention was linked to not reaching the population of interest by stating that "the organization is not interested in offering individual sanitation loans because they are too small and will not reach very poor populations..." (Emerging Markets Consulting, 2014). On the

other hand, the **intention** (e.g. intention to read a leaflet at home, Yeager et al., 2002) and **motivation** of people targeted by the promotional approach (e.g. motivation to adopt sanitation technology, Malebo et al. 2012) may act as facilitators in reaching a substantial amount of people when implementing sanitation and handwashing promotion programmes.

- Satisfaction

Satisfaction refers to the fulfilment of a need or want. Several of the included studies contained potential barriers related to the satisfaction of the recipients/implementers. The following barriers at the level of the implementer and related to the satisfaction of the recipient were found: **a lack of interaction** between recipient and trainer when using passive teaching methods (Xuan et al., 2013), **a lack of collaboration** with experts (Rheinländer et al., 2012 and Whaley & Webster, 2011), **lack of training** of the implementer (Hueso & Bell, 2013 and Rheinländer et al., 2012), **lack of communication** by the implementer (Whaley & Webster, 2011) and **inappropriate attitude** of the implementer (e.g. the manner and language towards villagers was not appropriate) (Emerging Markets Consulting, 2014). Other barriers related to recipient satisfaction were a **lack of privacy** (e.g. during open defecation) (Akter & Ali, 2014), **cost** of the hardware (e.g. water) (Kiwanuka et al., 2015), and **political strategies** (e.g. priorities for borehole locations during political campaigns because politicians want votes) (Kiwanuka et al., 2015). In case of social marketing approaches and use of a loan system, the loan **repayment method** (e.g. high interest rates) and **slow loan processing times** were found to be barriers (Emerging Markets Consulting, 2014). Barriers related to the satisfaction of the implementer were: **criticism** by authorities (e.g. for not achieving improved sanitation despite the effort) (Rheinländer et al., 2012), and **frustration** about not achieving enough results (i.e. no effective programme) (Rheinländer et al., 2012).

Other evidence identified 9 potential facilitators to keep recipients/implementers satisfied: **interactive teaching methods** and dialogue between villagers and trainers (Xuan et al., 2013 and Yeager et al., 2002), **confidence** in the health promoter's competence, training and ability to make change. (Andrade, 2013 and Malebo et al., 2012), **innovative training materials** (i.e. soap opera style of the video), **full participation** to the programme (Emerging Markets Consulting, 2014), **collateral benefit** of a WASH loan/fund (i.e. a contribution toward loan repayment and funeral expenses on the death of any member of the client's household) (Emerging Markets Consulting, 2014), respect toward and the **proudness** of the recipient (Andrade, 2013).

5.3.2 Programme environment factors

Barriers/facilitators related to all programme environment themes (training materials, funding/resources, intent of a programme to change a specific outcome, providing leadership to the implementing organization and partnerships) were extracted from the qualitative evidence. One additional theme was developed after coding the primary evidence/author statements: community capacity. An overview of all barriers and facilitators identified can be found in Table 46 and Appendix 12.

- Training materials

Evidence from five studies identified the following potential barriers related to training materials: **safety risk** (e.g. risk of stealing education materials) (Lansdown et al., 2002), **limited availability of marketing materials** (Emerging Markets Consulting, 2014), **lack of detailed instruction guides** (Brooks et al., 2015), or **cost price** (of a latrine). Another barrier was **cultural insensitivity**, e.g. the use of bodnas, which are traditionally used for anal cleansing after defecation, as handwashing station in both urban and rural (Hulland et al., 2013).

Two studies with a major community-based component and 1 study promoting water and sanitation via educational messaging identified sufficient **availability** (Graves et al., 2013 and Lawrence et al., 2016) and **distribution** of the training materials (Jimenez et al., 2014) as potential facilitators.

- Community capacity

Several of the included studies identified the following barriers: **knowledge dissemination** by children to their parents, which was perceived as improper (Lansdown et al., 2002), the **lack of accountability** of WASH Committees (Bruck & Dinku, 2008), the **lack of support** in constructing latrines (Bruck & Dinku, 2008), the **lack of involvement** of the Education Office (Bruck & Dinku, 2008) or village and ward leaders (Jimenez et al., 2014), insufficient **capacity building** (e.g. village leaders receiving little training on sanitation software) (Hueso & Bell, 2013; Silali & Njambi, 2014), the **lack of sense of ownership** (e.g. community owners are only called to implement projects, and are not involved in the development of the project) (Silali & Njambi, 2014; Schouten & Methenge, 2010) and the **involvement of government-dominated stakeholders** (Rheinländer et al., 2012).

In two school-based programmes focusing on sanitation (Lansdown et al., 2002) or sanitation, handwashing and water supply (Graves et al., 2013), teachers and mothers indicated that **knowledge dissemination** by children toward the parents could also be considered as proper. In line with this evidence, one study revealed that there was a **multiplier effect from parents to children** and that this led an improved connection (Langford & Panter-Brick, 2013). During a community-based handwashing programme conducted in El Salvador, individuals identified **instrumental support** of health promoters, the promoter's **dedication** to the hygiene and well-being of the community, and **guiding/educating** people of the community, as potential facilitators (Andrade, 2013). During the Total Sanitation Campaign in India, sanitation key informants indicated that **capacity building** and **village leadership** had a positive influence on community connectivity (Hueso & Bell, 2013). Indeed, community leadership and the use of **programme leaders** were also considered as potential facilitators in 2 other community-based WASH programmes conducted in Sub-Saharan Africa (Katsi, 2008; Smith et al., 2004). Evidence from four different community-based studies found that **sense of ownership** by the community members may serve as a positive driver to improve community capacity (Kiwanuka et al., 2015; Sarker & Panday, 2007; Schouten & Mathenge, 2010; Jimenez et al., 2014). A final beneficial factor to increase community capacity was creating **financial self-management** capacity, which is the

practice of sharing resources among community members to enhance the integration and solidarity in the village (Sarker & Panday, 2007).

- Funding/resources

The most frequent reported barrier, identified in different community-based approaches (such as the MTUMBA approach in Tanzania, RUWASA in Uganda, and CLTS in Zambia) and social marketing programmes, was the **limited financial, technological or facilitation capacity**. An example of this is the lack of construction materials, expensive loans, insufficient programme funding, increased governmental charge, or inadequate budget allocation (Bruck & Dinku, 2008; Jimenez et al., 2014; Katsi, 2008; Lawrence et al., 2016; Malebo et al., 2012; Emerging Markets Consulting, 2014; Whaley & Webster, 2011, Kiwanuka et al., 2015; Schouten & Mathenge, 2010). During 2 community-based sanitation programmes performed in Tanzania (Jimenez et al., 2014) and India (Hueso & Bell, 2013) specific **payment modalities** (e.g. upfront payments from clients) also served as potential barriers to the recipient's resources. Finally, during a social marketing-based WASH programme implemented by WaterSHED in Cambodia (Emerging Markets Consulting, 2014), late payments by the implementer to the sanitation teachers was indicated as a barrier.

From interviews and focus group discussions conducted during the CLTS approach in Tanzania, it was noted that **affordable technology** was raised as a potential facilitating factor. Evidence from other community-based programmes conducted in Bangladesh, Kenya and Zambia suggested other facilitators such as the **financial assistance** of the Bangladesh Rural Advancement Committee (BRAC) (Akter & Ali, 2014), **fundraising/income-generating activities** by the community members (e.g. membership fee, collection of seasonal crops and indirect support of partner NGOs) (Sarker & Panday, 2007), **reasonable payment modalities** (e.g. monthly charges) and the use of **local/traditional building materials** (Lawrence et al., 2016).

- Intent of a programme to change a specific outcome

Community Health Club facilitators indicated that changing their **mentality** may serve as a positive driver to behaviour change of the community (Brooks et al., 2015)

- Providing leadership to the implementing organization

During the Total Sanitation Campaign in India, the **decision-making process** of government officers and engineers was seen as a barrier because they neglected sanitation in favour of more stimulating and costly water projects (Hueso and Bell, 2013). Stakeholders that were interviewed during the SANIVAT project ("Water supply, sanitation, hygiene promotion and health in Vietnam) also indicated that a **lack of collegial support or supervision** by experts may play a negative role (Rheinländer et al., 2012). During another community-based programme in South Africa, household heads said that **open discussion** promoted the credibility of each leader (Smith et al., 2004).

- Partnership, coordination between providers of the same intervention or other health interventions

Several community-based studies implemented in different continents (Sub-Saharan Africa, The Caribbean and South-East Asia) criticized the **lack of partnerships** ranging from the lack of partnerships between members of Community Health Clubs (Brooks et al., 2015), the lack of partnerships with the government/NGO (Brooks et al., 2015), the lack of partnership with the private sector (Bruck & Dinku, 2008) to the lack of inter-sectoral collaboration (Rheinländer et al., 2012). Evidence from 2 community-based and 1 social marketing study suggested that a **lack of coordination** (Bruck & Dinku, 2008; Malebo et al., 2012), **information** (Malebo et al., 2012), **communication** (Malebo et al., 2012; Emerging Markets Consulting, 2014), or **involvement** (of the loan officers) (Emerging Markets Consulting, 2014) may hinder well-constructed partnerships. Households during the MTUMBA approach raised the **lack of quality** and skills of the partners as a major limitation to get a successful programme (Malebo et al., 2012). During the SANIVAT project in Vietnam, different stakeholders complained about the **lack of responsibility** by both the implementers and the recipients (Rheinländer et al., 2012). Finally, evidence from 3 community-based WASH programmes and 2 social marketing-based WASH programmes indicated that **coordination** (with health offices) (Bruck & Dinku, 2008), **decentralized systems** (Hueso & Bell, 2013) and **partnerships with government and/or NGOs** (Kiwanuka et al., 2015; Emerging Markets Consulting, 2014; Whaley & Webster, 2011) would be beneficial factors for durable partnerships.

- Training/qualification of the implementers

Evidence from 1 educational promotional programme and 1 community-based sanitation/water supply intervention, both conducted in Sub-Saharan Africa, suggested a **lack of financial resources** as a barrier to train implementers appropriately.

5.3.3 Implementer-related factors

In our initial ToC, we only defined recipient-related factors in addition to the programme environment factors and process evaluation factors. However, in community-based approaches the recipients are typically involved as (secondary) implementer, called for example a health promoter or community leader. However, at the same time they are also recipient of the approach. We therefore created a separate category “implementer-related factors”, containing the same factors as were predefined for the recipients. Barriers/facilitators related to most (4/6) pre-identified factors were extracted from the qualitative studies. No information was available for 2 factors: self-efficacy and awareness about personal risk. An overview of all barriers and facilitators identified can be found in Table 47 and Appendix 13.

- Awareness about costs and benefits

For this factor, we only identified evidence from a study describing a social marketing approach and making use of a loan system (Emerging Markets Consulting, 2014). The **availability and sustainability of sanitation loans** was found to be a facilitator for programme implementation (Emerging Markets Consulting, 2014). **Prices** of the latrine business (delivering latrines) that not

seemed to be competitive with prices of latrines supplied in the market, was found as a barrier for the awareness about cost and benefits, and consequently programme implementation (Emerging Markets Consulting, 2014).

- Motivation

Motivation was a newly identified theme, compared to our initial ToC. A factor negatively influencing the motivation of sanitation teachers was **late payment of their salary**, since they earn an income from selling latrines on commission (Emerging Markets Consulting, 2014). A facilitator for motivation was the **feeling of responsibility** of community health educators (Smith et al., 2004).

- Planning skills

Time constraints were found to be a barrier for the planning skills of the implementer, and thus for programme implementation. This was found in 3 studies with a community-based, education and social marketing approach, respectively. Time constraints were present at different levels, from teachers not making time to visit parents (Lansdown et al., 2002) to pressure to present positive results (Hueso & Bell., 2013), and workload and time in promoting sanitation loans (Emerging Markets Consulting, 2014). In addition, having **other priorities** (Yeager et al., 2002) and the **bureaucratic loan application process** (Emerging Markets Consulting, 2014) were barriers for timely planning by the implementer.

- Others showing behaviour

For the implementer it was important that people in the environment began to show the correct behaviour. In a study describing a school-based education approach, **lack of cooperation or interest** from parents was seen as a barrier (Lansdown et al., 2002). The following facilitators were found: **people showing the behaviour**, which could be used as a demonstration moment for the health facilitators (Andrade, 2013), and **translation** of a school-based effect to the community via the children (Graves et al., 2013).

- Public commitment

On the level of the implementer some evidence was found in a study describing a social marketing approach about the lack of commitment of the loan officers, which slowed down the loan process (Emerging Markets Consulting, 2014).

5.3.4 Recipient-related factors

In our initial ToC, we included 6 recipient-related factors (themes) that might influence implementation of promotional approaches: awareness about costs and benefits, planning skills, awareness of personal risk, others showing behaviour, public commitment and self-efficacy. For all these categories, barriers and facilitators were identified. In addition, two extra recipient-related themes were identified in the included studies, namely motivation and knowledge. An overview of all barriers and facilitators identified can be found in Table 48 and Appendix 14.

- Awareness about costs and benefits

Several barriers were identified, related to the recipients' awareness about costs and benefits of the implemented intervention. Recipients were reported by several studies to be concerned about their **financial means** to participate in community-based and approaches containing elements of psychosocial theories (Brooks et al., 2015; Langford & Panter-Brick, 2013; Schouten & Mathenge, 2010). Other barriers, reported for an approach that contained elements of psychosocial theories and that targeted handwashing with soap, were a **lack of importance** attached to the intervention by the recipients and the **time** it took to perform the handwashing with soap (Langford & Panter-Brick, 2013). In a social marketing-based promotional approach, which provided loans, the **bureaucratic loan application process** was mentioned to be a barrier for implementation (Cole et al., 2015).
Nevertheless, the **availability of loans** was considered a facilitator for the implementation of the social marketing-based promotional approaches (Cole et al., 2015; Emerging Markets Consulting, 2014). In addition to this, **awareness about improved health** because of the interventions was reported as a facilitator for educational and community-based promotional approaches (Akter & Ali, 2014; Andrade, 2013; Bruck & Dinku, 2008; O'Donnell, 2015). Furthermore, the advantage of improved **cleanliness** was suggested to be a facilitator for both community-based and approaches containing elements of psychosocial theories (Andrade, 2013; Langford & Panter-Brick, 2013; Smith et al., 2004). An additional benefit that was mentioned to be a facilitator in both community-based and social marketing-based promotional approaches, was the possibility to **gain extra resources** as a result of the intervention, indicating that an additional incentive related to the intervention might be an important factor to persuade people to get involved (Cole et al., 2015; Whaley & Webster, 2011). A study on a community-based intervention also reported that the presence of a **loan system for health problems** might be a facilitator for the intervention (Sarker & Panday, 2007). Finally, sanitation and hygiene messaging suggested using **new technologies** to reach people being a facilitator for the implementation of the intervention (O'Donnell, 2015).

- Motivation

A barrier for implementation that was mentioned by studies on community-based and approaches containing elements of psychosocial theories was that recipients had **no time** to care about WASH interventions, as they had other priorities, for example fulfilling their basic needs (Akter & Ali, 2014; Hueso & Bell, 2013; Langford & Panter-Brick, 2013). Another suggested motivational barrier for community-based approaches is the fact that some people just don't like to give up on old **habits** (Akter & Ali, 2014). Finally, in one study with a community-based approach, it was reported that some recipients feel **undervalued** by the implementers, as they are expected to participate for free, while visiting district officers would be paid for their participation (Jimenez et al, 2014).
A potential motivational facilitator that was reported by two community-based approach studies, was the fact that interventions which required **active input** of the community instilled **a sense of ownership** (Hueso & Bell, 2013; Kiwanuka et al., 2015).

- Planning skills

Time constraints was suggested to be a barrier towards implementation in one community-based study where people were sometimes found to be 'too busy' to apply the interventions (Akter & Ali, 2014). Another reported barrier in a community-based approach study was the **political climate**, which forced people to relocate for employment, thus resulting in too little labour force available for execution of the intervention (Whaley & Webster, 2011).
In one social marketing-based intervention study, the application of **risk reduction strategies**, which would protect people involved in the intervention financially through for example a plan to generate surplus income, was suggested to be an implementation facilitator (Cole et al., 2015).

- Awareness of personal risk

Being **unaware of disease spread** was reported to be a barrier for implementation in two studies on a community- and an approach containing elements of psychosocial theories (Langford & Panter-Brick, 2013; Lawrence et al., 2016).
Conversely, being **aware of disease spread** was considered a facilitator for implementation in an approach based on sanitation and hygiene messaging, a community-based approach and an approach containing elements of psychosocial theories (Akter & Ali, 2014; Andrade, 2013; Brooks et al., 2015; Hueso & Bell, 2013; Langford & Panter-Brick, 2013; Lawrence et al., 2016; Malebo et al., 2012; Sarker & Panday, 2007; Smith et al., 2004; Xuan et al., 2013; Yeager et al., 2002; Whaley & Webster, 2011). Another factor that was a facilitator for the implementation of community-based approaches was the induction of **feelings of shame and disgust** in response to old habits and practices (Lawrence et al., 2016; Malebo et al., 2012). In addition, **awareness about the financial risk** was considered to be a facilitator for a social marketing-based approach, as people would work cooperatively to avoid financial distress (Cole et al., 2015).

- Knowledge

A study on a social marketing-based promotional approach, where people could apply for micro-loans, suggested that recipient's **lack of knowledge** on financial products might be a limiting factor on the implementation of the intervention (Emerging Markets Consulting, 2014).
On the other hand, **knowledge about hygienic behaviour**, such as hand washing at key times, was considered a facilitator for implementation in a study on a community-based promotional approach (Akter & Ali, 2014).

- Norms

In one study on a community-based promotional approach, it was noticed that a **lack of social expectations** concerning certain hygienic behaviours might be a barrier for implementation of the intervention (Langford & Panter-Brick, 2013).
Conversely, if there was **social control** regarding hygienic behaviour, this could be a facilitator for the implementation of a community-based approach or an approach containing elements of psychosocial theories (Hulland et al., 2013; Langford & Panter-Brick et al., 2013).

- Others showing behaviour

A study on a community-based approach, using a model-home competition used to stimulate community members to compete with each other in hygienic behaviour, found that this **competition** could be a barrier for implementation in people who would not do so well and would end up being disappointed (Whaley & Webster, 2011).
On the other hand, if done less explicitly, **behaviour by other community members** could stimulate hygienic behaviour and even induce healthy competition between community members, as suggested by 4 community-based approach and one social marketing-based approach studies (Akter & Ali, 2014; Cole et al., 2015, Andrade, 2013; Lawrence et al., 2016; Whaley & Webster, 2011). Also, members of the own household showing the right behaviour might be a facilitator for the implementation of a community-based approach (Andrade, 2013).

- Public commitment

In a community-based promotional approach study, where people were invited to become part of a community health club, it was suggested that this type of **new identity formation** could be a facilitator for the implementation of the intervention, as people would hold each other accountable for good behaviour (Brooks et al., 2015). Correspondingly, in an intervention study of an approach with elements of psychosocial theories, it was also reported that taking a **public pledge** might be a facilitator for implementation of the intervention (Rajaraman et al., 2014). No barriers regarding the public commitment theme were identified in the included studies.

- Self-efficacy

A community-based approach study stated that **low initial self-efficacy** might be a barrier towards implementation of the approach (Andrade, 2013).
Therefore, keeping community-based interventions simple might be a facilitator for the implementation (Andrade, 2013). Furthermore, self-efficacy could also be a facilitator for implementation of community-based approaches (Lawrence et al., 2016).

5.3.5 Implementer-related contextual factors

In our initial ToC, we included a box with socio-cultural, physical and personal contextual themes of the recipients. However, since the contextual factors of the implementers were as important, we included a separate category of implementer-related contextual themes. An overview of all barriers and facilitators identified can be found in Table 49 and Appendix 15.

- Personal context

Barriers/facilitators of different **demographic variables** were found in two studies where a community-based approach was applied, whereas no information about physical/mental health was identified. The importance of **gender** of the health promoter was mentioned as a factor that could influence programme effectiveness. From this evidence, it was clear that women would not ask specific sensitive questions, such as birth control or personal hygiene, to a male health promoter (Andrade, 2013). However, for more general items, such as hygiene in the home, this

would less play a role (Andrade, 2013). Two studies also found evidence about the importance of the implementer being **part of the community** (Bruck & Dinku, 2008; Andrade, 2013). It was suggested that there would be less trust in an implementer who is not part of the community, that the implementer would not be interested in the target group, and that communication would be less efficient with a person who does not know the community.

- Socio-cultural context

Barriers/facilitators of the following themes were identified: dignity and respect, information environment, law-legislation, socioeconomic status-role model-authority and social capital. No statements were linked to culture, religion, ethnicity, minorities or division of labour. Social-political environment was created as a new theme. In two studies, it was suggested that implementers being friendly, treating the villagers well, paying attention to language and attitude towards the villagers, and having a relationship of trust are facilitators of implementation (Andrade, 2013; Emerging Markets Consulting, 2014). Furthermore, the continued **availability and accessibility** (in terms of being present, but also clarity of information) of the health promoter or change agent seemed important aspects (Andrade, 2013; Cole et al., 2015). One additional theme that we identified under the header "information environment" is **sponsorship transparency**, since for villagers it is important to know if there are any conflicts of interest of companies or politicians in the implementation of a certain promotional approach (Rajaraman et al., 2014). Evidence from 5 studies suggest that it is important that there is a **local or national legislation** (Bruck & Dinku, 2008; Kiwanuka et al., 2015) and that there is no laxity in law implementation (Jimenez et al., 2014; Malebo et al., 2012; Schouten & Mathenge, 2010). For the factor "socioeconomic status-role model-authority" evidence from several studies suggested that the implementer's (health promoter, traditional leader) **authority** and a **higher social standing** (than the community members) play a role in their power and credibility (Andrade, 2013; Katsi, 2008; Smith et al., 2004; Rajaraman et al., 2014). Developing a culture of sharing resources, sharing responsibility, cooperation and **a sense of solidarity** was also found to be a facilitator for implementation (Sarker & Panday, 2007; Brooks et al., 2015). A final socio-cultural factor, that was initially not identified in our ToC, was the social-political environment: **political interruption** of the intervention and politicians influencing the programme was found to be a barrier of programme implementation (Kiwanuka et al., 2015).

- Physical context

Barriers of the following themes were identified: available space, natural and built environment, place of residence (rural vs urban) and remote areas (Schouten & Mathenge, 2010; Brooks et al., 2015; Lawrence et al., 2016; Rheinländer et al., 2012). More in detail, evidence suggested that **low accessibility to infrastructure or areas**, e.g. because of the wet season (Schouten & Mathenge, 2010) or because implementers could not reach a remote area (Lawrence et al., 2016; Rheinländer et al., 2012), was a barrier to effective implementation of the promotional approach. Other barriers identified were **lack of resources** to maintain the infrastructure (Schouten & Mathenge, 2010), or members of Community Health Clubs not being representative for the community (Brooks et al., 2015). No statements were linked to low vs middle-income countries and safety.

5.3.6 Recipient-related contextual factors

For almost all themes/sub-themes included in our initial ToC, at least one barrier or facilitator was found in the included studies. An overview of all barriers and facilitators identified can be found in Table 50 and Appendix 16.

- Personal context

Several **demographic variables** were suggested to be a facilitator or barrier for the implementation of the promotional approaches. **Age** was suggested to be an influencing factor in multiple studies. Younger age was thought to be associated with a decreased knowledge translation to family members in one study using sanitation and hygiene messaging (Xuan et al., 2013). Furthermore, being of younger or older age might be a barrier for the implementation of handwashing interventions based promoted via elements of psychosocial theories (Hulland et al., 2013; Rajaraman et al., 2014). On the other hand, involvement of children in community-based approaches was suggested to be a facilitator for the implementation of the programme (Lawrence et al., 2016).
Gender was a factor that was mentioned in multiple papers describing community-based interventions, both as a facilitator and as a barrier (Adeyeye, 2011; Andrade, 2013; Katsi, 2008; Kiwanuka et al., 2015; Pardeshi, 2009; Rheinländer et al., 2012; Sarker & Panday, 2007; Silali & Njambi, 2014; Smith et al., 2004). Three studies suggested male gender to be a barrier for the implementation of community-based interventions, as men are often the ones responsible for wage-earning and therefore less concerned about household-related activities, including hygiene maintenance (Andrade, 2013; Silali & Njambi, 2014). Furthermore, one study reported men to feel threatened as household heads by the involvement of women in a community-based promotional approach (Katsi, 2008). Three studies reported female gender to be a barrier, due to living in a patriarchal society, where men oversee decision-making, leading to decreased involvement and informing of females in the programmes (Adeyeye, 2011; Pardeshi, 2009; Rheinländer et al., 2012). In contrast, if women are able to be actively involved, female gender was thought to be a facilitator for the implementation of a community-based approach and a promotional approach containing elements of psychosocial theories, as females are often considered responsible for the household and education of children (Adeyeye, 2011; Andrade, 2013; Hulland et al., 2013; Kiwanuka et al., 2015; Pardeshi, 2009; Sarker & Panday, 2007; Smith et al., 2004). Furthermore, as women are considered to be major beneficiaries of WASH interventions, women were reported to be very enthusiastic about being involved in community-based WASH interventions. The fact that sanitation interventions improved the privacy of women was also thought to be a facilitator for the implementation of a community-based intervention (Bruck & Dinku, 2008).
Illiteracy was suggested by one study on a community-based intervention to be a barrier for understanding the importance of improved hygiene and sanitation (Malebo et al., 2012).
One study describing an approach containing elements of psychosocial theories suggested that **busy work** was a barrier for women regarding the implementation of the intervention (Langford & Panter-Brick, 2013).
One study concerning an approach containing elements of psychosocial theories, using public

pledging, suggested that **religion** might be a barrier towards implementation of this approach, as Muslims might feel this is against their religion (Rajaraman et al., 2014).

- Social-cultural context

Different sub-themes were included in our initial TOC: culture, division of labour, ethnicity, law/legislation, minorities, status/role model/authority, social capital, dignity/respect, religion, information environment. For all subthemes but dignity/respect and religion, at least one recipient-related contextual facilitators or barrier was identified.
Concerning cultural factors, one study using sanitation and hygiene messaging identified **local dialects** to be a barrier towards the implementation of the intervention (O'Donnell, 2015). Traditional **stubbornness** towards change, cultural **traditions and taboos** concerning defecation practices, and people's **cultural background** were found to be barriers in 5 community-based intervention studies (Andrade, 2013; Katsi, 2008; Lawrence et al., 2016; Malebo et al., 2012; Schouten and Mathenge, 2010). No culturally related contextual facilitators were identified in the studies included in this review.
One study on a community-based intervention suggested that taking into account the **division of labour**, with different roles for males and females in the intervention, might be a facilitator for the implementation (Adeyeye, 2011).

Ethnicity, more specifically concerning ethnic groups with a nomadic lifestyle, was thought to be a barrier for the implementation of a community-based promotional approach (Malebo et al., 2012). No facilitators were identified concerning ethnicity in the included studies.
With regard to law/legislation, a barrier towards the implementation of promotional approaches was **corruption**, as suggested by one study on a community-based approach (Hueso & Bell, 2013). Furthermore, another study on a community-based approach indicated that **crime** (vandalism of sanitation facilities) might impede the implementation of the intervention (Schouten & Mathenge, 2010). The development of **by-laws** might be both a facilitator and a barrier towards the implementation of community-based approaches, depending on the content of the by-law (Bruck & Dinku, 2008; Kiwanuka et al., 2015).

For the sub-theme minorities, **language and traditional ethnic lifestyles** were identified by one study on a community-based approach as barriers for the implementation of the intervention (Rheinländer et al., 2012).
Concerning status/role model/authority, **poverty** was identified as a barrier for the implementation of and approach using sanitation and hygiene messaging, and community-based, as well as social marketing-based approaches (Hueso & Bell, 2013; Langford & Panter-Brick, 2013; Malebo et al., 2013; Emerging Markets Consulting, 2014; Xuan et al., 2014). Furthermore, **illiteracy** was suggested to be a barrier towards implementation of a sanitation and hygiene messaging intervention (O'Donnell, 2015). A **lack of hierarchical pressure** was thought to be a barrier towards the implementation of a community-based approach (Malebo et al., 2012). Facilitators identified for the implementation of a community-based intervention were **improvement in social status** because of the intervention (Akter & Ali, 2014), **hierarchical pressure** to implement the intervention (Lawrence et al., 2016) and the development of **leaders** within the community by the intervention (Brooks et al., 2015). Furthermore, the presence of **role**

models within the community was suggested to be a facilitator for the implementation of a social marketing-based approach (Cole et al., 2015).

Several facilitators with regard to social capital building were suggested. The improvement of **social connections** within a community was proposed to be a facilitating factor in the implementation of community-based approach by two studies (Sarker & Panday, 2007; Whaley & Webster, 2011). In addition, another study found that the availability of **solidarity mechanisms** within a community might facilitate the implementation of a community-based approach (Jimenez et al., 2014). Furthermore, one study suggested that development of a culture of **cooperation** within the community was a facilitator for the implementation of a social marketing-based approach (Cole et al., 2015).

- Physical context

Several sub-themes were included in our initial ToC concerning recipient-related physical contextual factors: available space, low vs middle-income countries, natural and built environment, place of residence, remote areas and safety. For all these sub-themes, at least one facilitator or barrier was identified.
Living in **densely populated areas** or having **small living quarters** were mentioned to be barriers for the implementation of a community-based approach or an approach based on elements of psychosocial theories (Brooks et al., 2015; Hulland et al., 2013; Schouten & Mathenge, 2010). Not surprisingly, the advantage of **saving space** was suggested to be a facilitator for the implementation of a social marketing-based approach (Cole et al., 2015).
With regard to income, living in a **high-income village** was considered to be a facilitator for the implementation of a social marketing-based approach (Emerging Markets Consulting, 2014). No barriers were identified concerning this sub-theme in the included studies.
Concerning the natural/built environment sub-theme, **maintenance of infrastructure** was found to be an important consideration, as **lack of maintenance** was reported to be a barrier for the implementation of community-based approaches (Bruck & Dinku, 2008; Lawrence et al., 2016). Furthermore, **low quality of infrastructure** was also suggested to be a barrier for the implementation of community-based approaches by 4 studies (Bruck & Dinku, 2008; Malebo et al., 2012; Schouten & Mathenge, 2010; Whaley & Webster, 2011), as were poor soil conditions and insufficient access to building materials and clean water (Akter & Ali, 2014; Malebo et al., 2012; Lawrence et al., 2016; Whaley & Webster, 2011). A barrier identified for the implementation of a social marketing-based approach was the **complexity** of the intervention that was presented (Cole et al., 2015). A study using a handwashing with soap intervention based on elements of psychosocial theories reported **a lack of access**, **a lack of visibility**, **a small water storage capacity** and **frequent renter change** of a handwashing station all to be barriers for the implementation of the programme (Hulland et al., 2013). Finally, overall **dirtiness** of the environment was suggested to be a barrier towards the implementation of an approach based on elements of psychosocial theories (Langford & Panter-Brick, 2013). Facilitators for the implementation of a community-based approach were improved **cleanliness** (Lawrence et al., 2016) and living in open spaces, which increased the need for a private area for defaecation (Whaley & Webster, 2011). **High-quality infrastructure** was identified as a potential facilitator

towards the implementation of a social marketing-based sanitation intervention, as was a climate with a rainy season, as the presented intervention did no longer require pit-digging (Cole et al., 2015). Increased **visibility** of the handwashing station, easy **access** to water, and the **availability** of replacement parts were suggested to be facilitators for the implementation of a handwashing with soap intervention based on elements of psychosocial theories (Hulland et al., 2003).
The place of residence also influenced programme implementation, as living in **highland areas** was thought to be a barrier for children receiving a sanitation and hygiene messaging intervention, as compared to children living in lowland areas (Xuan et al., 2013). Furthermore, living in a **conflict area** was proposed to be a barrier towards the implementation of a community-based approach, due to safety issues (Brooks et al., 2015). A facilitator for the implementation of a social marketing-based approach was living in **city centres**, as people living there tend to be wealthier (Emerging Markets Consulting, 2014).
Living in **remote areas**, with lesser access to water or sanitation facilities, was suggested to be a barrier towards the implementation of a community-based approach (Lawrence et al., 2016) or a programme using sanitation and hygiene messaging (Graves et al., 2013).
One study describing a sanitation and hygiene messaging intervention showed that **safety** might be a barrier towards implementation, as education materials used in the study were reported to be stolen (Lansdown et al., 2002).

5.3.7 Sensitivity analysis

A sensitivity analysis (excluding studies with a CAP-score < 8/10, i.e. 6 studies, see figure 14) was included to evaluate the magnitude of methodological flaws or the extent to which it has a small rather than a big impact on the findings and conclusions. Overall, the impact of excluding the 6 lower quality studies was considered as rather small. The robustness of the evidence around the barriers/facilitators of the **process evaluation factors** was considered as high since the sensitivity analysis (excluding studies with a CASP-score of <8/10) revealed that only 2 factors were excluded from the model (i.e. intention of people as a facilitator to reach a sufficient amount of people and innovative training materials as a facilitator to keep recipient/implementers satisfied). The same robustness was present for the barriers/facilitators of the **programme environment factors** was considered since the sensitivity analysis excluded only 4 factors from the model (i.e. the income-generating activities and payment modalities as facilitators for funding/resources, the lack of financial resources as a barrier for training implementers and the self-financial management capacity as a facilitator for community capacity). The impact of the sensitivity analysis on the **implementer-related and recipient-related factors** was rather small with exclusion of 1 barrier ('other priorities' as a barrier) and 2 facilitators ('the use of new technologies' and 'the presence of loan systems for health'), respectively. Finally, the sensitivity analysis resulted in the exclusion of 3 **implementer-related contextual barriers** (2 related to the physical context: lack of financial resources and lack of accessibility of the facilities and 1 related to the social-political context: corruption) and 4 **recipient-related socio-cultural barriers** (local dialects, division of labour, crime and illiteracy).

6 Discussion

6.1 SUMMARY OF MAIN RESULTS

6.1.1 Quantitative studies

In total, 42 quantitative studies were identified. The effect of a promotional approach versus not using a promotional approach on sanitation and handwashing behaviour change, behavioural factors (knowledge, skills, attitude, norms and self-regulation) and health-related outcomes (morbidity and mortality), was examined in 34 different studies. In addition, 7 studies compared specific promotional approaches versus other promotional approaches, and 2 studies compared two different communication strategies. Methodological heterogeneity across studies was present, i.e. difference in programme content (27 different combinations of promotional elements), study types (32 experimental, 8 quasi-experimental and 2 observational studies), outcome types (binary versus continuous versus (un)adjusted calculated effect sizes), methods of measurement (self-reported versus direct observation) and timing of measurement (during programme implementation versus ≤12/>12 months after implementation of the programme).

To find out the absolute effect of any promotional approach (versus not using a promotional approach), we pooled data across approaches in several meta-analyses. However, because of the above described heterogeneity, only a small proportion of the data could be pooled, and statistical heterogeneity (I^2>50%) was found in most of the meta-analyses, making it difficult to formulate clear conclusions about which promotional approach is the most effective.

Subsequently, we looked at the individual (unpooled) outcomes across the 4 categories of promotional approaches/promotional elements (compared to not using a promotional approach). An overview of these outcomes, with an indication of their results and the certainty of the evidence according to the GRADE approach, is provided in Table 51. The promotional approach as well as the WASH component(s) of the intervention is also shown in this table. Based on this table and the additional information about the study characteristics, we were able to formulate the following conclusions:

Table 51: Overview of quantitative studies comparing a promotional approach versus no promotional approach, with indication of results and certainty of evidence for primary outcomes (GRADE approach)

BEHAVIOURAL CHANGE OUTCOMES (PRIMARY)	Community-based approach			Social marketing approach			Sanitation and hygiene messaging			Elements of psychosocial theory		
	Uptake	Adherence	Longer-term use	Uptake	Adherence	Longer-term use	Uptake	Adherence	Longer-term use	Uptake	Adherence	Longer-term use
Handwashing	Younes 2015 (n=2) Jinadu 2007 (n=1) Phuanokoonnon 2013 (n=1) Phuanokoonnon 2013 (n=5) Pickering 2015 (n=1) Kochurani 2009 (n=1) Huda 2012 (n=7)			Cameron 2013 (n=1)	Briceno 2015 (n=2) Briceno 2015 (n=13) Galiani 2015 (n=2) Galiani 2015 (n=10) Arnold 2009 (n=5)		Kaewchana 2012 (n=1) Mascie-Taylor 2003 (n=1) Pickering 2013 (n=5) Pickering 2013 (n=3) Stanton 1987 (n=1) Yeager 2002 (n=2) Abiola 2012 (n=1) Abiola 2012 (n=1)		Luby 2009 (n=2) Bowen 2013 (n=5) Bowen 2013 (n=9)	Luby 2010 (n=10) Luby 2010 (n=9) Langford 2013 (n=4) Langford 2013 (n=1)	Biran 2014 (n=2)	
Certainty of evidence (GRADE)	LOW	LOW	VERY LOW	N/A	VERY LOW		MODERATE	LOW	LOW	LOW	MODERATE	
Latrine use	Waterkeyn 2005 (n=1) Jinadu 2007 (n=1) Jinadu 2007 (n=1) Pattanayak 2009 (n=1) Hoque 1996 (n=2) Pickering 2015 (n=2)			Briceno 2015 (n=2) Briceno 2015 (n=1)			Caruso 2014 (n=2)					
Certainty of evidence (GRADE)	N/A	LOW	LOW	MODERATE			VERY LOW					
Safe faeces disposal practices	Waterkeyn 2005 (n=1) Waterkeyn 2005 (n=1) Patil 2015 (n=1) Patil 2015 (n=1) Jinadu 2007 (n=2) Pickering 2015 (n=1) Huda 2012 (n=1)			Arnold 2009 (n=1) Briceno 2015 (n=3) Briceno 2015 (n=6)			Yeager 2002 (n=1) Yeager 2002 (n=1)					
Certainty of evidence (GRADE)	VERY LOW	MODERATE	LOW	VERY LOW			LOW					
Open defecation practices	Patil 2015 (n=3) Guiteras 2015b (n=2) Guiteras 2015b (n=1) Pickering 2015 (n=4) Kochurani 2009 (n=1) Kochurani 2009 (n=1) Guiteras 2015b (n=1)			Cameron 2013 (n=1)	Briceno 2015 (n=3) Briceno 2015 (n=6)		Wang 2013 (n=1) Lansdown 2002 (n=1) Wang 2013 (n=1) Stanton 1987 (n=1)					
Certainty of evidence (GRADE)	MODERATE	MODERATE	VERY LOW	N/A	MODERATE		LOW	LOW				

BEHAVIOURAL FACTORS	Community-based approach	Social marketing approach	Sanitation and hygiene messaging	Elements of psychosocial theory
Knowledge	Andrade 2013 (n=4), Kochurani 2009 (n=4), Phuanukoonnon 2013 (n=1)	Galiani 2015 (n=3), Pinfold 1999 (n=2), Briceno 2015 (n=4)	Lansdown 2002 (n=1), Mascie-Taylor 2003 (n=4), Abiola 2002 (n=2)	Tumwebaze 2015 (n=4)
	Kochurani (n=2), Phuanukoonnon 2013 (n=6)	Cameron 2013 (n=20), Galiani 2015 (n=5), Briceno (n=2)	Lansdown 2002 (n=1), Seimetz 2016 (n=3), Abiola (n=2)	
Skills		Biran 2009 (n=2)	Bowen 2013 (n=5), Luby 2009 (n=6)	Tumwebaze 2015 (n=2)
			Bowen 2013 (n=3), Luby 2009 (n=2), Seimetz (n=2)	Tumwebaze 2015 (n=4)
			Seimetz 2016 (n=1)	
Attitude		Cameron 2013 (n=9)	Abiola 2012 (n=2), Seimetz 2016 (n=4)	Tumwebaze 2015 (n=6)
			Seimetz 2016 (n=1)	
Norms		Briceno 2015 (n=1)	Seimetz 2016 (n=1)	
		Briceno 2015 (n=2)		
Self-regulation			Seimetz 2016 (n=1)	
			Seimetz 2016 (n=1)	
HEALTH OUTCOMES				
Morbidity				
Diarrhoea	Hoque 1996 (n=1)			Langford 2013 (n=1)
	Hoque 1996 (n=1), Pickering 2015 (n=2), Huda 2012 (n=1), Younes 2015 (n=1), Patil 2015 (n=1)	Cameron 2013 (n=2), Briceno 2015 (n=6), Arnold 2009 (n=1), Galiani 2015 (n=4)		
High credible gastrointestinal illness	Patil 2015 (n=1)	Arnold 2009 (n=1)		
Acute respiratory illness	Younes 2015 (n=1), Patil 2015 (n=1)	Galiani 2015 (n=4), Arnold 2009 (n=1),		
Mortality	Pickering 2015 (n=2)	Briceno 2015 (n=3)		

Icons adapted from: http://www.watersanitationhygiene.org/

 Intervention contains hygiene (handwashing) component

 Intervention contains sanitation component

 Intervention contains water supply/water quality, sanitation, and hygiene (handwashing) component

 Intervention contains water treatment and sanitation component

 Intervention contains water treatment and handwashing component

 Intervention contains sanitation and hygiene (handwashing) component

The number of outcomes measured is indicated between brackets.

Green: statistically significant results in favour of the intervention; red: non-statistically significant results; yellow: statistically significant results in favour of the control

N/A: Not applicable (no GRADE assessment performed, only one outcome)

- Community-based approaches (n=12). Community-based approaches involve community members in the implementation of the approach, and shared decision-making is typically part of the approach. All but one study in this category implemented a sanitation intervention, in some cases combined with a handwashing and/or water supply/water quality component. Community-based approaches may improve ***handwashing*** with soap during the research period, and in the period less than 12 months after the end of the intervention. This was based on 4 different studies (Younes et al., 2015, Jinadu et al., 2007; Pickering et al., 2015; Kochurani et al., 2009), however in a study with serious risk of bias an effect could not be demonstrated for a number of outcomes (Phuanukoonnon et al., 2013) (low certainty evidence). We are uncertain whether community-based approaches improve handwashing in the period more than 12 months after the end of the intervention (very low certainty evidence). Community-based approaches probably improve overall ***latrine use, safe faeces disposal and open defecation*** practices during the implementation, and in the period less than 12 months after the end of the intervention (low/moderate certainty evidence). These outcomes may improve more than 12 months after the end of the intervention (low to very low certainty evidence, see Table 51). This conclusion is based on information from 8 studies (see Table 51). However, it should be noted that (1) a significant effect in safe faeces disposal in the longer term could not be shown in one study with serious risk of bias (Huda et al. 2012), (2) for the specific outcomes of latrine use in children between 2 and 5 years old (Jinadu et al. 2007), presence of faeces in living areas (Waterkeyn & Cairncross, 2005; Patil et al., 2013/2015), and open defecation by boys in a school environment (Kochurani et al., 2009), no effect could be shown, and (3) in one study only significant effects were found if the promotional programme was combined with use of incentives (Guiteras et al., 2015b). For the behavioural factors, we found that community-based approaches significantly improved ***knowledge*** of key handwashing times (Andrade, 2013; Kochurani et al., 2009), but results about the knowledge of causes and consequences of diarrhoea were mixed (Andrade, 2013; Phuanukoonnon et al., 2013). Finally, a significant decrease in acute ***respiratory tract illness*** (Younes et al., 2015; Patil et al. 2015), however no consistent effect on ***diarrhoea*** could be shown (5 studies, see Table 51). No differential effects were achieved in case of a combined or sanitation only intervention.

- Social marketing approaches (n=6). Social marketing approaches are aimed at creating demand and make use of commercial enterprise techniques. All but one study in this category implemented a handwashing intervention, with one study of these also having a sanitation-only and a combined intervention group, one study that combined with a water supply/water quality component, and one sanitation-only study. No uniform positive effect was shown for ***handwashing*** with soap outcomes (4 studies, see Table 51), and the overall certainty of evidence for the handwashing outcomes was very low, meaning that the effect of the intervention on handwashing behaviour is uncertain. If a sanitation and handwashing intervention are combined, the intervention probably improves ***latrine use*** and decreases ***open defecation*** 12 months after the end of the intervention (moderate certainty evidence) (Briceno et al., 2015), which was not the case for a handwashing intervention or sanitation intervention alone (Briceno et al., 2015; Cameron et al. 2015b). We are uncertain whether social marketing approaches improve safe faeces disposal practices (very low certainty evidence).

Effects on ***knowledge*** were mixed: effects on the knowledge about the causes of diarrhoea could not be demonstrated (Cameron et al., 2013; Galiani et al., 2015), and effects on general handwashing knowledge were only shown in specific contexts (e.g. only in combination with a sanitation intervention, or only when the community as well as schools were targeted) (Briceno et al., 2015; Galiani et al., 2015). Consistent positive effects on ***skills, attitude*** and ***norms*** were not found (3 studies, see Table 51). Social marketing approaches could not improve ***morbidity*** outcomes (5 studies, see Table 51). No differential effects were seen for the study with a combined water component in the intervention, or where only a sanitation component was implemented (see Table 51).

- Sanitation and hygiene messaging (n=12). Sanitation and hygiene messaging are educational approaches mainly using one-way communication and a directive way of educating. All but one study in this category implemented a handwashing intervention, in some cases combined with a sanitation and/or a water supply/water quality component. Sanitation and hygiene messaging probably improves ***handwashing*** with soap during the project period (moderate certainty evidence) (3 studies including 1 school-based intervention, see Table 51). In one study at school level, a significant increase in handwashing with soap/hand sanitizer was shown, but not in the total handwashing occasions with or without soap, meaning that handwashing already regularly occurred before the handwashing with soap/hand sanitizer intervention was implemented (Pickering et al., 2013). After the end of the intervention, sanitation and hygiene messaging may make little or no difference to handwashing behaviour (low certainty evidence). The evidence for the ***sanitation outcomes*** was of low to very low certainty, meaning that sanitation and hygiene messaging may make little or no difference to sanitation outcomes: no effect on latrine use and open defecation was shown (4 studies, see Table 51), and the effect on safe faeces disposal practices was inconsistent (Yeager et al., 2002). When focusing on behavioural factors, sanitation and hygiene messaging could not consistently improve ***knowledge*** of personal hygiene, causes of diarrhoea and health (4 studies, see Table 51). In addition, no consistent effect on ***skills*** (3 studies) and ***attitude*** (2 studies) were shown (see Table 51). In addition, no effect on norms and self-regulation could be shown (Seimetz et al., 2016). Again, no differential effects were seen when the handwashing intervention was combined with another WASH component, or in case of a sanitation-only intervention (see Table 51).

- Elements of psychosocial theory (n=4). In four studies a small-scale intervention was studied based on behavioural factors derived from a psychosocial theory, using formative research. All studies implemented a handwashing-only intervention. Elements of psychosocial theory may improve ***handwashing*** with soap at key times, during the project period (Luby et al., 2010; Langford et al., 2013) and less than 12 months after the end of the project (Biran et al., 2014) (moderate to low certainty evidence), however for a number of key times the effect could not be demonstrated. Effects on behavioural factors such as ***knowledge, skills and attitude*** were mixed (Tumwebaze & Mosler, 2015). Based on one study, a significant reduction in ***diarrhoea*** was demonstrated.

The addition of separate elements derived from psychosocial theory, to an existing educational (hygiene messaging) approach, was measured in 3 studies:

- Infrastructure promotion (and use of reminders). Statistically significantly improved handwashing was shown, when adding a component of infrastructure promotion to a school-based health education (hygiene messaging) intervention (Zhang et al., 2013). In a second study, use of infrastructure promotion and reminders also resulted in a significant increase in handwashing, and a significant correlation between the promotional approach and the majority of measured behavioural factors (Contzen et al., 2015a/2015b).
- Public commitment and use of reminders. A statistically significant increase in handwashing could not be demonstrated, and a significant correlation between the promotional approach and less than half of the measured behavioural factors was shown (Contzen et al. 2015a/2015b).
- Infrastructure promotion combined with public commitment and use of reminders. The addition of elements of infrastructure promotion, public commitment and the use of reminders, to a health education (hygiene messaging) intervention, resulted in a significant increase in handwashing and a significant correlation between the promotional approach and several behavioural factors (Contzen et al., 2015a/2015b).
- Elements of disgust. When the hygiene messaging approach appealed to feelings of “disgust” in an urban area in Bangladesh, this resulted in improved knowledge of handwashing key times, but an effect on handwashing and on the feeling of disgust could not be shown (Guiteras et al., 2015a).

In addition to studies comparing a promotional approach with not using a promotional approach, some studies also investigated the relative effectiveness (comparison of two different types of approaches) (4 studies):

- Community-based approach: Community Health Clubs versus Community-Based Total Sanitation. No difference in latrine use and open faeces disposal was shown for this comparison (Whaley & Webster, 2011).
- Social marketing approaches: local-builder social marketing versus outside-expert building team. The local-builder social marketing approach resulted in a significant decrease in the number of households refusing to use the new toilet (Dickey et al., 2015).
- Hygiene messaging in schools: education with poster contest versus education alone. Adding a poster contest to a school-based education intervention did not result in a significant increase in handwashing (Graves et al., 2011).
- Elements of psychosocial theory: motivational intervention followed by self-regulatory intervention versus self-regulatory intervention followed by motivational intervention. No difference in handwashing could be demonstrated between these two interventions (Lhakhang et al., 2015).

Two studies compared different communication strategies:

- Intervention based on psychosocial theory: interpersonal communication. A significant increase in handwashing and decrease in morbidity outcomes was shown when interpersonal communication was added to a mass media campaign (Chase & Do, 2012).

- Social marketing approach: mass media campaign. It was shown that a mass media campaign alone had no effect on behaviour (handwashing) and behavioural factors (knowledge), while a combination with community involvement had some effect on handwashing and knowledge (Galiani et al., 2012/2015).

Finally, we also focused on the use of incentives as part of the promotional approach, which was the case in 10 of the included studies. Financial incentives included a modest salary and subsidies, and non-financial incentives included a motorcycle, lunch, food, gifts and soap. Incentives were mostly used in studies describing a community-based approach, but were also included in the other approaches. When comparing the studies with or without use of incentives, no major differences were seen, and absolute effects were similar. However, one study compared programmes with and without use of subsidies, and found significant better results for open defecation when subsidies were included as part of the community-based programme (Guiteras et al., 2015b). Use of incentives could be promising and warrants more research.

In summary, since each study described a specific promotional approach, even within one category of approaches, it was difficult to generalise our findings. However, several promising promotional elements were identified. The most consistent results were obtained within the category of community-based approaches, where at least a sanitation component was part of the programme. It was concluded that working in a community-based way may be effective in terms of handwashing with soap, and sanitation outcomes (latrine use, safe faeces disposal, and open defecation). The use of social marketing approaches seems to be less uniformly applicable, and this approach mainly shows an effect on sanitation outcomes when sanitation is part of the intervention. When implementing a social marketing approach, working with the community, for example using local builders, and considering consumer preferences, could be crucial. Sanitation and hygiene messaging, with a focus on handwashing with soap, seem to have an effect on handwashing with soap immediately after the intervention has ended. However, these effects are not sustainable in the long term. The use of elements derived from psychosocial theory, such as infrastructure promotion, public commitment, or elements of disgust, seems promising and warrants further research. Finally, the methods used for communicating the content of a certain promotional approach, also play a role, and the use of interpersonal communication was shown to be effective in certain circumstances. None of the promotional approaches described in the review showed consistent effects on behavioural factors such as knowledge, skills and attitude. Also no consistent effects on health were demonstrated.

6.1.2 Qualitative studies

In total, 28 qualitative studies were identified. Below we give a summary of the 6 categories of influencing implementation factors for which barriers and facilitators were identified from qualitative research. First, we list influencing factors that were relevant across all promotional approaches.

- Process evaluation factors. In the initial ToC, nine process evaluation factors were identified. For 2 of these, recruitment and attrition, no barriers and facilitators from qualitative studies were identified. Barriers and facilitators that were relevant across different types of

promotional approaches were: intervention duration, visit frequency, and communication methods, with use of long messages and lack of communication being barriers for implementation.

- Programme environment factors. In the initial ToC 6 process evaluation factors were included. For each factor, barriers and facilitators were identified in qualitative research, and one additional factor was identified, being “community capacity”. Barriers and facilitators that were relevant across different types of promotional approaches were: availability of training materials, sufficient funding/resources and partnerships with local government, NGOs and between community-members.

- Implementer-related factors. In the initial ToC 6 implementer-related factors were identified. For 2 of these, awareness of personal risk and self-efficacy, no barriers and facilitators from qualitative studies were identified. In addition, one new positive driver was identified: motivation. Time constraints seemed to be a barrier that was relevant across different types of promotional approaches.

- Implementer-related contextual factors. In the initial ToC 26 different contextual factors were identified, in the group of socio-cultural, physical or personal contextual factors. For 15 of these no evidence from qualitative studies was identified: culture, religion, ethnicity, minorities, division of labour, low- versus middle-income countries, safety, age, race, cast, language, education, occupation, physical health and mental health. In addition, one new factor was identified: social-political environment. Contextual factors that were relevant across promotional approaches were: kindness and respect of the implementer, accessibility of the implementer, and the implementer’s authority/status.

- Recipient-related factors. In the initial ToC 6 implementer-related factors were identified. For each factor, barriers and facilitators were identified in qualitative research, and three additional factors were identified: motivation, knowledge and norms. Recipient-related facilitators that were relevant across promotional approaches were: awareness about costs, awareness about benefits, social control, and others showing the behaviour. Barriers across approaches were: having other priorities, time constraints and not being aware of spread of disease.

- Recipient-related contextual factors. The same 26 contextual factors were also included for the recipients, and for 10 of these no evidence was found in qualitative studies: dignity/respect, religion, information environment, age, race, cast, language, occupation, physical health and mental health. Contextual factors that were relevant across promotional approaches were: age, gender, available space, access to the infrastructure, poverty and social capital (solidarity, cooperation, social connection).

In addition to barriers and facilitators that are relevant across different promotional approaches, we also identified barriers and facilitators that are specifically relevant for one type of promotional approach:

- Community-based approach. The majority of qualitative studies described a community-based promotional approach (18 out of 28 studies). The following factors were influencing process evaluation factors relevant for community-based approaches: enthusiasm of community leaders, income generating activities at health clubs, and lack of implementer training in participatory development methods. Barriers and facilitators of programme environment factors were: involvement of communities, implementers accountability, responsibility and having a sense of ownership, lack of communication/information from the implementers to the recipients. Within the category of implementer-related contextual factors, the following factors were typically relevant for a community-based approach: the implementer being part of the community and being representative for the community, gender of the implementer (since villagers sometimes want to discuss private items with an implementer of the same sex), being able to trust the implementer, and developing a culture of cooperation. In the category of implementer-related factors, a typical facilitator for community-based approaches was the use of people showing the behaviour in real life as a teachable moment. A recipient-related factor that seemed to be a barrier was that villagers felt undervalued, since they were asked to perform voluntary work as part of the participatory process. The introduction of competition, and identity formation within a health club (e.g. using a club name and slogan) were found to be facilitators. Finally, gender was a recipient-related contextual factor relevant for the implementation of community-based approaches (e.g. men not having time to participate in community-based WASH activities; women not having the same decision-making power).

- Social marketing approach. Only one study reported on barriers and facilitators to process evaluation factors, specifically influencing the implementation of social marketing approaches. Barriers identified for this approach were mainly about the use of sanitation loans (lack of communication to latrine business owners about which area to cover, sanitation loans not reaching poor people, attitude of the loan officers, interest rate of loans, loan processing times). One qualitative study searched for barriers and facilitators to implementer-related factors. The bureaucratic application process for sanitation loans and costs for a loan were seen as a barrier. Two studies reported on barriers and facilitators related to recipient (contextual) factors. Lack of financial knowledge and poverty were found to be a barrier for the recipients, while additional income/resource generation and durability of the infrastructure were facilitators.

- Sanitation and hygiene messaging. Three studies reported on barriers and facilitators to process evaluation factors (two at school level, and one at community level with SMS messages). Barriers identified were (SMS) messages that were too long, passive teaching methods in schools, the need for longer intervention periods and frequent reminders with children, overlap of school level intervention with interventions in the community, and lack of interest from the family in case of a school intervention. One study reported on barriers and facilitators to programme environment factors, influencing a sanitation and hygiene messaging approach at school level. The study found that when using this approach, it was difficult to disseminate behaviour from children to parents because it was felt improper for children to teach parents. No barriers or facilitators for implementer-related contextual factors were identified. One study reported on barriers and facilitators to other implementer-related factors, and these concerned lack of involvement of the parents. Three studies reported on barriers and

facilitators related to recipient (contextual) factors (two at school level, and one at community level with SMS messages). Time constraints, improper (SMS) messages (not culturally sensitive), poverty of communities, and illiteracy were seen as a barrier, while awareness of disease risk by parents was a facilitator.

- Elements of psychosocial theory. No barriers or facilitators specifically related to using elements of psychosocial theory were identified. However, two studies using a community-based approach reported the use of emotive factors, such as shame and disgust, as a facilitator for implementation.

6.1.3 Integrated synthesis

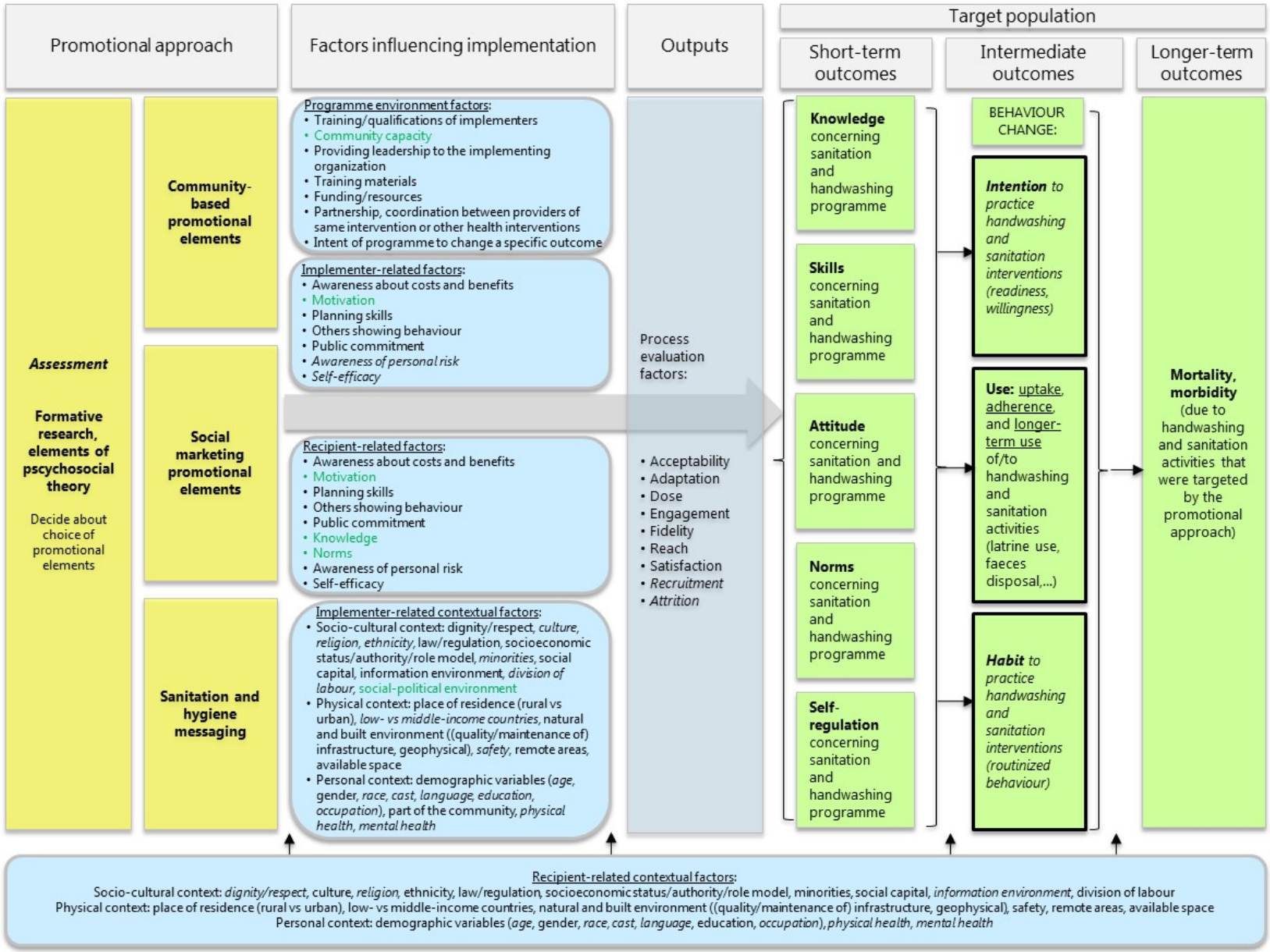
In order to make an integrated synthesis of both qualitative and quantitative findings, key summary points from both were integrated within the initial ToC, so the original ToC was refined (Figures 15 and 16). For the majority of pre-defined outcomes and factors, influencing implementation evidence was identified (see Figures 15 and 16).

First of all, we describe whether key findings for the different groups of influencing factors were also reported in the quantitative studies. Secondly, we used the qualitative findings as possible explanatory factors for the conclusions we drew from the quantitative findings. Based on input from different stakeholders it seemed relevant to focus on: (1) why social marketing approaches had mixed effects, and (2) why sanitation and hygiene messaging, which is thought to be an ineffective approach for behaviour change because of its directive approach, was found to result in some effect on handwashing in the short term.

First we describe which of the influencing factors identified from qualitative research, were also reported in the quantitative studies:

- **Process evaluation factors**. For 5 of the 7 process evaluation factors supported with qualitative evidence, information was extracted from quantitative studies: adaptation, dose, engagement, fidelity, and reach. Adaptation and dose were reported in more than half of the quantitative studies (51% and 78% respectively). Engagement (by the implementer or participant) was only reported in 17% of the studies, fidelity in 10% of the studies and reach in 44% of the studies.

Figure 15: Integrated synthesis: results from quantitative and qualitative findings coupled back to ToC



Legend: Green boxes contain short-term, intermediate or longer-term outcomes. Primary outcomes are indicated in boxes with a black border. Blue boxes contain factors that can influence the implementation of the promotional approaches. Factors indicated in green are newly identified compared to the original ToC. Items in italics are not supported with evidence from our systematic review.

- **Programme environment factors.** For 5 of the 6 programme environment factors supported with qualitative evidence, information from quantitative studies was extracted: training/qualifications of the implementer, providing leadership to the implementing organization, training materials, funding/resources and partnership/coordination between providers of the same or other health interventions. Only the training or qualifications of the implementer were reported in more than half of the quantitative studies (58%). Leadership of the implementer was only reported in 36% of the studies, quality of the training materials in 32% of the studies and funding/resources in 24% of the studies. Remarkably many qualitative studies reported barriers and facilitators towards partnerships, but only 5% of the quantitative studies mentioned this factor.

- **Implementer-related contextual factors.** For the majority of these factors barriers and facilitators were identified in qualitative studies. From the quantitative studies information was only extracted on the identity of the implementers, and in addition, on the following contextual factors: ethnicity, age, gender, and socio-economic status. Ethnicity and age were only reported in 10% of the quantitative studies, socio-economic status in 12% and gender in 27%. We can conclude from this that only very limited information on implementer-related contextual factors is reported, while qualitative evidence suggests that these factors are very relevant.

- **Implementer-related factors.** In many promotional programmes, and specifically in community-based approaches, community members are involved in the implementation and thus also function as (secondary) implementers. As a consequence, the recipient-related factors that were included in the ToC are factors that are also relevant for the implementers (called “implementer-related factors” in the descriptive analysis of the qualitative evidence). Almost no information on barriers and facilitators was found in qualitative studies. In addition, no information on these factors was extracted from the quantitative studies, and thus we cannot conclude if this information is frequently reported in the quantitative studies.

- **Recipient-related (contextual) factors.** From the qualitative analysis these factors seem to be important in programme implementation, however extracting these factors from the quantitative studies was beyond the scope of this project.

Second, we used the qualitative findings as possible explanatory factors for the conclusions we drew from the quantitative findings.

- **Community-based approaches**. Most of the qualitative studies reported on factors influencing community-based approaches, which indicates that most research went into this specific type of approaches. From the 18 qualitative on community-based approaches, we found the following influencing factors that could play a specific role in the implementation of community-based interventions are: a facilitator (e.g. health promoter, community leader) that is part of and representative of the community, the attitude of the implementer/facilitator, providing enough information, and creating a culture of

cooperation. In addition, the gender of the facilitator seems to play an important role, since women prefer to discuss private issues instead of somebody of the same sex. Based on the description of the intervention in the quantitative studies on community-based approaches, it was concluded that many of these factors were already taken into account. This could explain why this approach resulted in the most consistent effects both on handwashing with soap and sanitation outcomes.

- **Social marketing approaches**. Only two qualitative studies reported on barriers and facilitators to the implementation of social marketing approaches. The majority of the barriers identified were related to the use of sanitation loans: the interest rate on loans, loan processing times and the bureaucratic application process, loans being too expensive and not reaching the poor, and lack of financial knowledge. Additional income/resource generation, and durability of the infrastructure were seen as a facilitator. These influencing factors are typically relevant for a social marketing approach, and could explain mixed effects of this type of approach. Partnerships with government and NGOs were identified as a facilitator for implementation. Finally, an inappropriate attitude of the implementer seemed to be a barrier, and real involvement and accessibility of the implementer a facilitator. It should be noted that these factors (partnerships, attitude of the implementer) were also identified with community-based approaches, and therefore it is not really clear if they can explain the effects of social marketing approaches on behaviour change.

- **Sanitation and hygiene messaging**. Five studies reported on barriers and facilitators in terms of this promotional approach (three at school level, one at community level with SMS messages, and one at community level with video and pamphlet messages). Most of the barriers identified were related to how the messages were delivered to the recipients: (SMS) messages that were too long or that were not culturally sensitive, passive teaching methods in schools, poverty and illiteracy, the need for longer intervention periods and frequent reminders with children, overlap of school level intervention with interventions in the community, difficulty in disseminating behaviour from children to parents because it was felt improper for children to teach parents, and lack of interest and involvement from the family in case of a school intervention. This could explain the lack of effect in this type of approach, as shown in the quantitative studies. The use of some (inter)active teaching methods with children, innovative messaging, interventions of longer duration, and being able to influence parents via the children, which was the case in some of the quantitative studies, could be factors explaining some short-term results with this type of promotional approaches.

Due to heterogeneity at different levels (WASH component, promotional approach, outcome measures, and timing of outcome measurement), we only performed a limited number of meta-analyses, and few studies per intervention and outcome category were included. As a consequence, no subgroup analyses were made. We also identified a serious number of barriers and facilitators from qualitative studies, and these were not always reported in the quantitative studies. Therefore, we were not able to use these barriers and facilitators in subgroup analyses and to confirm if they indeed influence implementation of handwashing and sanitation promotional approaches.

Based on the available evidence and the input collected during our stakeholder meeting, following changes to our initial ToC were made:

- Six categories of potential influencing implementation factors are now presented in the ToC, as described above.

- Since not one promotional approach was shown to be effective, and most probably elements of each approach should be combined in practice, we used “promotional elements” instead of “promotional approaches” in the ToC.

- We only included the categories of promotional elements that were identified in this review: community-based promotional elements, social marketing promotional elements, sanitation and hygiene messaging, and elements of psychosocial theory.

- Since elements of psychosocial theory were identified as a consequence of formative research on a small scale, and these elements should be incorporated in broader promotional approaches to scale, we added this type of promotional elements to an “assessment box”, which was introduced before the intervention boxes in the ToC. The assessment period when developing a programme is a preparatory phase in which the problem is identified and a decision about the choice of promotional elements is made.

- It is now indicated for which elements of the ToC evidence was lacking (italics), and which new influencing factors were identified from qualitative research (green).

6.2 OVERALL COMPLETENESS AND APPLICABILITY OF EVIDENCE

6.2.1 Quantitative studies

We identified 42 quantitative studies (46 references) to answer the first review question "What is the effectiveness of different approaches to promote handwashing and sanitation behaviour change in communities in low- and middle-income countries?".

The studies we identified were performed in LMICs worldwide, with the majority of the studies in South Asia and Sub-Saharan Africa. Most studies (68%) were performed in a rural setting and only 14% of the studies took place in an urban setting (with an additional 12% in an "informal-rural setting"). Since differential behaviour in rural versus urban settings has been noticed (Fiebelkorn et al., 2012), it would have been interesting to have more data from urban settings. No data from emergency settings were identified.

Concerning the intervention, studies were available on the major promotional approaches, including community-based approaches, social marketing approaches, sanitation and hygiene messaging and interventions based on psychosocial theory. However, we pre-specified in our protocol that "incentives" or "advocacy" would also be relevant elements of promotional approaches. Since these elements were most often used in combination with other promotional elements, it was not possible to draw conclusions about the additive value of these elements. In addition, we hypothesised that communication strategies would also be important in obtaining behaviour change; however, only one study specifically compared different communication strategies, by adding elements of interpersonal communication to a mass media approach. Elements of traditional communication (songs, theatre, parades) were sometimes part of one of the approaches in the studies, but the additional effect of these elements was not studied.

Our pre-defined primary outcomes were measured in almost all the studies (n=38, 93%). We defined behaviour change as "use", "intention" and "habit", but almost no information about intention and habit was measured (n=2, 5%). For the secondary outcomes, most studies measured knowledge and skills. In order to have a complete view on the hypotheses we made in our theory of change, more information about attitude, norms and self-regulation would be valuable. Health outcomes were measured in some, but not all of the studies.

Overall, the evidence we identified to answer the effectiveness question was relatively complete, i.e. evidence was identified for the majority of the interventions and outcomes that were predefined. Due to the large availability of studies in the WASH sector, we were able to exclude indirect populations (e.g. studies conducted in higher-income countries), indirect interventions (e.g. programmes without a clear promotional approach) or indirect outcomes (e.g. proxy-indicator for latrine use such as latrine construction or latrine hygiene). This means that the current evidence directly answers our review questions. The methodological and conceptual heterogeneity, however, prevent us from generalising our findings to different contexts. In addition, since we were not able to make sub-group analyses, the applicability of the evidence in rural versus urban contexts, middle-income versus low income countries, is difficult to determine. Also, 56% (n=23) of the studies were at small scale, meaning that the evidence is not necessarily applicable on a larger scale

(or vice versa). Since no evidence from an emergency setting was found, it will be difficult to apply the evidence identified in such a context.

6.2.2 Qualitative studies

We identified 28 qualitative studies to answer the second review question “What factors influence the implementation of approaches to promote handwashing and sanitation behaviour change, in communities in low- and middle-income countries?”.

These studies were conducted in LMICs worldwide, with the majority of the studies in Sub-Saharan Africa and South Asia, as was the case for the quantitative studies. Again, most studies (68%) were performed in a rural setting and only 11% of the studies took place in an urban setting. In addition, 11% were performed in an “informal-rural setting” (i.e. slums, settlements) and 7% in both a rural and urban area.

Concerning the intervention, studies were available on the major promotional approaches, however the majority of the studies (71%) described a community-based approach. No studies were identified that looked at factors influencing implementation of a specific communication strategy.

The majority of the predefined factors (or barriers/facilitators of these factors), which were part of the initial ToC, were described in the qualitative studies. In addition to the factors that were initially described in the ToC, information on 7 additional factors was retrieved from the qualitative evidence. For 19 factors, including 15 contextual factors, no information was included in our studies. This can partly be explained by our particular focus on factors influencing implementation: process evaluation factors, programme environment factors and implementer- and recipient-related factors. The lack of information from qualitative studies on contextual factors such as religion, age, race, language, occupation and physical/mental health, does not mean that these are not relevant. It simply means that we have not opted for a systematic selection of articles addressing the broader contextual factors, nor for an extensive extraction of such information from the selected articles.

Overall, the evidence we identified to answer the question about implementation was relatively complete, i.e. evidence was identified for the majority of the factors that were predefined.

6.3 QUALITY OF THE EVIDENCE

6.3.1 Quantitative studies

The GRADE approach was used to assess the overall quality of evidence (certainty of evidence) included in this review. In most GRADE assessments, the certainty of evidence was considered as ‘low’ and in some cases ‘moderate’ or ‘very low'. The interventions assessed were complex. Included studies varied greatly – from the intervention studied to the outcomes measured – thus resulting in high levels of inconsistency. The majority of studies were experimental studies, including 22 cluster RCTs, 4 RCTs, and 6 quasi-RCTs. No intra-cluster correlations (ICC) were reported in 15 of the cluster RCTs. Risk of bias assessments of included studies were influenced by unclear reporting or

lack of reporting of key methodological aspects of the study design and process. Many included studies did not report how allocation sequence was generated. Due to the type of intervention, blinding of the participants (performance bias) and blinding of the outcome assessors (detection bias) were not considered. To assess detection bias, we rather considered whether the outcome was measured subjectively (self-reported) or objectively (direct observation). Most quasi-experimental and observational studies had bias in the selection of participants, some were at high risk of confounding, methods of outcome assessment were not comparable across intervention groups, and outcome assessors were aware of the interventions that the groups received.

6.3.2 Qualitative studies

The qualitative findings mainly explored and created an understanding of the impact of process and implementation factors on the causal chain developed in the ToC. We considered the use of the CerQual approach to assess the overall confidence in the findings from the qualitative evidence synthesis part. However, because it has not fully been tested yet on review projects that attempt to refine a predefined conceptual model, we decided to postpone this exercise to the next update. We are confident that the new guidance currently in development will allow us to include such an assessment in future updates of this review. It follows that in this review project we only assessed the quality of primary research studies currently included in the review.

A quality assessment using the CASP checklist was performed for each qualitative study. The use of qualitative methodology, qualitative research design, recruitment strategy and data collection techniques was considered appropriate in almost all studies. For some studies (n=11) the relationship between researcher and participants was not adequately considered or ethical issues were not explicitly reported (n=10). The data analysis was sufficiently rigorous in 21 studies. An overall CASP score was given to the studies, and only 6 studies had a score less than 8/10. These studies were considered as studies with a lower quality, which were excluded in our sensitivity analysis.

6.4 LIMITATIONS AND POTENTIAL BIASES IN THE REVIEW PROCESS

This review used comprehensive methods to minimise bias during the review process. A clear protocol (with both methodological and stakeholder input) was published. Additionally, a comprehensive search was conducted to identify both published and unpublished studies. Two reviewers worked independently to select studies using the predetermined eligibility criteria, to extract data and to perform risk of bias assessments using a standardised data extraction form.

At the level of study selection, only controlled studies were included in this systematic review. This implies that evaluations conducted by practitioners, which are typically done without control group (e.g. before-after evaluations), were not included in this project. The latter can be seen as a potential limitation from the perpective of the practictioners. However, from a methodological point of view, (quasi-)experimental studies with a control group are the gold standard to address the absolute/relative effectiveness (of promotional approaches). No studies were included

describing older approaches such as SARAR or PRA. This could be due to the limitation in publication date (1980) that was applied to the search strategy.

We focused on direct outcomes and excluded indirect outcome measures (e.g. soap use for handwashing, absenteeism for morbidity). Because of a plethora of outcome measures reported in the papers, we decided to exclude behaviour change outcomes besides handwashing, latrine use, safe faeces disposal and open defecation (e.g. latrine maintenance, latrine hygiene, latrine construction, buying of latrines). Included studies assessed these outcomes as self-reported outcomes or via direct observation techniques. Self-reported outcomes are prone to reporting biases, which, as with this type of intervention, could often not be minimized in included studies by using blinding. In our risk of bias assessments of the included studies we considered how outcomes were assessed. There was significant heterogeneity between studies, which made it difficult to perform meta-analyses. In order to make overall conclusions, we classified all the approaches into 4 main categories, however there was still a lot of variation in the combinations of promotional elements. Furthermore, in most cases no formal promotional approach was named or identified in the study itself, so we decided a-posteriori which criteria should be fulfilled to be placed in a certain category (this was done by 4 team members independently, followed by internal discussion and formal agreement during our stakeholder meeting). In addition, because of the complexity of the interventions and outcome measures, we were not able to conduct subgroup analyses, and to draw conclusions about the role of the setting (urban versus rural), or equity factors such as gender, and socioeconomic status.

To enable data analysis across studies, we only used the raw data as reported in the studies, and only for one study we used the adjusted data from the paper since no raw data were available. Since the majority of the studies were experimental or quasi-experimental the issue of confounding factors is not problematic.

Of the 32 experimental studies included, 22 studies were cluster RCTs, which is a type of RCTs where groups of subjects are randomised instead of individuals. This type of design is not surprising for our intervention of interest, and is often used for logistical, feasibility or ethical reasons. However, participants within the same cluster may be more similar than participants from different clusters, possibly leading to correlation of observations within clusters. When this correlation is not accounted for, standard errors of the intervention effect will be too small (Donner & Clar, 2000). For 15 of the 22 cluster RCTs included in this review, the information to correct for the clustering effect (Intracluster Correlation Coefficient) was not available in the studies, and an ICC was estimated based on information from other studies (see Methods section).

Because of a high degree of heterogeneity we did not draw any conclusions about the effectiveness of using any promotional approach versus no promotional approach, and about the effectiveness of a specific promotional approach, based on the meta-analyses.

The long-term goal of a WASH promotion programme is to reduce morbidity and mortality. In our review, we only included morbidity/mortality data if studies assessed sanitation/handwashing behaviour (i.e. behaviour change outcomes or behavioural factors). Therefore, we need to emphasise that we only included a subset of data about the effectiveness of promotional

approaches on morbidity/mortality which may be misleading and might result in incorrect/incomplete conclusions. However, the additional value of this selection criterion is that we could explore the relationship between behaviour and morbidity/mortality.

A final limitation of the quantitative review process concerns the use of process evaluation factors as a descriptive context or to explain differences between findings across the quantitative studies. Many process evaluation factors were not described in all studies (e.g. fidelity, implementer engagement, participation engagement, etc.), but information on recruitment and dose were present in about 80% of the studies. Because of the above-mentioned heterogeneity in the promotional approaches, even within one category of approaches, we decided not to link the findings to information on aspects of implementation such as recruitment and dose.

There are also some limitations for the qualitative analysis. The decision for conducting a deductive type of qualitative synthesis approach (i.e. refining an a-priori theoretical model) rather than an interpretative qualitative synthesis approach was based on the availability of resources in terms of man-power and expertise within the team (dominantly quantitatively oriented). In future updates a sufficient amount of time should be preserved to study all relevant contextual factors impacting on the short, mid- and long term outcome of the promotional programmes and to conduct an interpretive type of synthesis that allows us to configure the findings into new theory. The focus on process and implementation factors should best be elaborated to allow reviewers to provide more details about social-cultural, political, physical and other factors that hinder or facilitate the engagement of our target group.

Although we found evidence (i.e. barriers/facilitators) for most themes in our ToC model, barriers/facilitators of several themes were not identified in the included qualitative studies, e.g. recruitment, attrition, religion, race, physical and mental health. Since we did not actively engage with potential disconfirming cases (i.e. other studies that addressed barriers/facilitators of these themes), we cannot rule out that some of these themes will not apply to the promotion of WASH programmes in nearby future. Future updates of this review may shed some light on the relevance of the factors that were lost in the move from our general ToC to the refined ToC based on the findings of this review.

6.5 AGREEMENTS AND DISAGREEMENTS WITH OTHER STUDIES OR REVIEWS

In the scoping phase of this review, an extensive overview of existing systematic reviews on WASH promotional programmes was performed to be able to focus the research questions of the current systematic review.

Six systematic reviews, that met the criteria set out in the scoping phase, were identified in response to these questions (Fiebelkorn et al., 2012; Mah et al., 2008; Ejemot-Nwadiaro et al., 2015; Evans et al., 2014; Hulland et al., 2015; Joshi & Amadi, 2013). Compared to the current review, in the scoping phase we also included systematic reviews that did not exclusively select studies from LMICs. However, from these reviews we selected those studies that fulfilled our

selection criteria. Another important difference is that in the scoping phase we included systematic reviews on all WASH aspects, and not only on sanitation and handwashing.

Two systematic reviews looked at education approaches (Ejemot-Nwadiaro et al., 2015, Joshi & Amadi, 2013). Three studies identified by Ejemot-Nwadiaro (2015) were also included in the current review (Luby et al., 2009; Pickering et al., 2013; Stanton & Clemens, 1985), under the category "sanitation and hygiene messaging". Other studies in this review were either performed in high-income countries, or did not focus on handwashing or sanitation, or only measured health outcomes, and thus were excluded from the current review. This review concluded that hygiene education resulted in an increase in handwashing at key times in a school and community setting, and a reduction in diarrhoea. For handwashing, these conclusions correspond to the findings of the current review; however, we only found a significant increase in a short term. We were not able to draw conclusions about the effect of these approaches on health outcomes in the current review, since no evidence for these outcomes was identified. None of the studies included in the review by Joshi & Amadi (2013) were incorporated in our systematic review, since either only health outcomes were reported, or the intervention was not a handwashing or sanitation intervention. The review (Joshi & Amadi, 2013) concluded that more research is needed to assess the long-term impact of the interventions.

Two systematic reviews looked at social marketing strategies. The systematic review by Evans et al. (2014) included two studies that were also incorporated in our review (Pinfold, 1999; Yeager et al., 2002), while the review by Mah et al. (2008) only included the study by Pinfold (1999). This study (Pinfold, 1999) was also categorised under "social marketing approach" in the current review, however the study by Yeager et al. (2002) was classified as "sanitation and hygiene messaging", since the definition of social marketing used by Evans et al. (2014) was less strict (at least one the 4 P's should have been used). Other studies included in these reviews did not fulfil our selection criteria, and were therefore excluded from the current review. These reviews concluded that results concerning behaviour and behavioural factors were mixed, which corresponds with our findings.

The systematic review by Fiebelkorn et al. (2012) included studies with various approaches, but focused on water treatment. One study included in this review (Arnold et al., 2009) was also included in the current review, since here a water treatment and handwashing intervention was implemented. The review concluded that there was first an increase in behaviour, and then a decline, and that differences between urban and rural settings were seen. This latter conclusion could not be verified in our systematic review, since subgroup analyses were not possible due to too much heterogeneity in interventions and outcomes.

A last systematic review was the review by Hulland et al. (2015), looking at factors influencing sustained adoption of WASH technologies. Four studies included in this review were also included in the current review (Bowen et al., 2013; Arnold et al., 2009; Whaley & Webster, 2011; Waterkeyn & Cairncross, 2005). The majority of the other studies did not study a specific promotional approach or did not fulfil our study type selection criteria. The review concluded that influential programme factors associated with sustained adoption include frequent, personal contact with a health promoter over a period of time. This corresponds with our current findings, since we also concluded that interpersonal communication is a relevant aspect.

Meta-analyses were not performed in any of the above mentioned systematic reviews. Similarly, in the current systematic review, due to the heterogeneity in population, programme content, study types, type of intervention, and outcome measurement, it was difficult to perform meta-analyses.

7 Authors' conclusions

7.1 IMPLICATIONS FOR PRACTICE AND POLICY

Stakeholder engagement occurred throughout this project. Our stakeholders contributed in formulating implications for practice and policy, and a stakeholder specific dissemination strategy was discussed.

Promotional approaches targeting handwashing and sanitation behaviour are complex programmes based on several promotional elements, and adapted to the context of the environment where they are implemented. This could be confirmed in the studies included in this review. From the quantitative findings we conclude that there is not one promotional approach that is more effective than another. In other words, one size does not fit all.

However, several effective elements of behaviour promotion could be identified, including:

1. **involving the community** in the context of sanitation programmes (i.e. community-based approach: involving the community in the different stages of the design and implementation of the intervention, therefore resulting in tangible actions taken by community members),
2. **social marketing elements** in the context of combined handwashing and sanitation programmes (e.g. determining people-centred needs, stimulating demand for handwashing and sanitation options, delivering desired satisfactions more effectively and efficiently than competitors, working with local builders and other entrepreneurs, considering consumer preferences and desires, etc.),
3. **adding elements derived from psychosocial theory** to the promotional approach in the context of a handwashing intervention (i.e. using psychosocial theory, social cognitive elements or theoretical elements of behaviour change to design the intervention), and
4. **use of interpersonal communication**, as part of the communication strategy. The review of studies that used sanitation and hygiene messaging, with emphasis on one-way communication, revealed that it seems not to be sufficient to achieve long-term effect on handwashing and sanitation (latrine use, safe faeces disposal, open defecation).

Concerning the use of incentives as part of the promotional approach, it is difficult to generalize findings, since we only found a limited number of studies that used a wide range of incentives (from soap bars, to food over subsidies). One study reported promising results when using

subsidies as part of the community-based approach, but more research on the use of subsidies and incentives would be valuable.

It should be noted that evidence concerning the use of elements derived from psychosocial theory was only found in small-scale studies implementing a handwashing programme, nevertheless such promotional elements could be added to a broader programme. Determining which theory-based elements are relevant in a certain context should be part of an assessment/pilot phase. Therefore, a more in-depth formative research during the assessment phase, leading to the right selection of promotional elements, seems to be a critical step for programmes aiming at behaviour change for sanitation and handwashing.

A combination of approaches, including several promotional elements as described above, is likely to be the most effective strategy. This is currently acknowledged as best practice in the WASH sector, as we learned from our Advisory Group and different stakeholders (practitioners, policy makers).

In addition to the characteristics of a certain promotional approach, a wide variety of influencing factors should be taken into account during implementation. Based on our findings from qualitative studies, key barriers and facilitators need to be well understood when planning an intervention and selecting the right combination of promotional approaches. Those barriers and facilitators are related to:

1. the programme environment (e.g. funding, partnership, coordination, etc.)
2. the implementation process ("process evaluation factors") (e.g. acceptability, dose, reach, fidelity, etc.)
3. implementer-related (contextual) factors (e.g. leadership, attitude, gender, etc.)
4. recipient-related (contextual) factors (e.g. motivation, others showing behaviour, culture, education etc.)

Key barriers and facilitators for each of the four sections above were identified in this review, and revealed equally critical in terms of selecting successful promotional approaches. These influencing factors are likely to explain the success or failure of a promotional programme and are a real added value for practitioners.

For **community-based approaches**, a facilitator (e.g. health promoter, community leader) who is part of the community and is representative of the community is very relevant. The attitude of the implementer, being enthusiast and responsible, and providing enough information, seemed important, and creating a culture of cooperation would facilitate implementation. Specifically, for community-based approaches, where the implementer is part of the community and thus has a certain bond with the villagers, the gender of the implementer seems to play an important role, for example, women would rather trust a female implementer when they wanted to discuss female hygiene and private issues such as birth control.

In the case of **social marketing approaches**, the use of sanitation loans could result in barriers of implementation in some cases, since this has been seen as a slow process, which can be

expensive, thus not reaching the poor and people with lack of financial knowledge. Additional income generation would be an important facilitator for this type of approach.

In case of **sanitation and handwashing messaging**, commonly understood in the sector as 'hygiene education', it seems key that messages are delivered using active teaching methods and that messaging is innovative and culturally sensitive. In case of school level interventions with children, the duration of the intervention and involving the children's parents seem to be positive influencing factors.

A prior assessment of the context and situation, by doing formative research, will provide more information on which influencing factors to take into account and which elements could be included in the promotional strategy.

An important implication for the future is that there is an urgent need to use a more uniform method of outcome measurement (type of outcomes, way of assessment, timing of assessment). This will facilitate making conclusions on the effects of promotional approaches in the future (see also 7.2). In addition, it is important to further test barriers and facilitators, identified in this review, alongside quantitative analyses of promotional approaches.

7.2 IMPLICATIONS FOR RESEARCH

Based on the review of the 41 quantitative studies we included, we can formulate some specific recommendations for future research.

Firstly, the analysis of the 41 quantitative studies resulted in the identification of the gaps in evidence that answers our primary review question. On the population level, only few studies were available from the Latin America and Caribbean region, and from French-speaking African countries. In addition, most studies were performed in a rural setting, and it would also be valuable to have evidence on the effect of handwashing and sanitation promotional approaches in urban settings. No studies were performed in a disaster setting, and more research in this specific context is warranted. Concerning interventions more research is needed on the effect of marketing approaches and the use of elements derived from psychosocial theory. From consultation with our stakeholders, we learned that the addition of incentives to existing approaches such as CLTS is currently being questioned, however we only found a limited number of studies that incorporated incentives into the promotional approach. One study reported promising results, but more research on the use of subsidies and incentives would be valuable. In addition, since we hypothesised that communication strategies would also play a role in the effect of promotional approaches, and we only identified one study that compared different communication strategies, more research on this subject is needed. On the outcome level, more outcome measurement in the longer term is needed, especially for the marketing approaches, in order to be able to draw conclusions about programme sustainability.

A second recommendation for researchers is based on how the outcomes were measured across the included studies. We established that there was a large variability in the way outcomes were measured across studies, using different assessment methods (e.g. self-reported versus observation

methods), outcome measures (dichotomous, continuous, different outcome types) and different timings of measurement. This makes it very difficult to compare and synthesize outcomes across studies (e.g. in the format of a meta-analysis), and therefore there is an urgent need for research to use a more uniform method of outcome measurement (type of outcomes, way of assessment, timing of assessment). In addition to outcome assessment, outcome reporting is also important, e.g. good reporting practices for experimental studies are described in the CONSORT checklist.

A third recommendation for future research concerns the ability to identify effective promotional elements that could be part of a promotional approach. Because of the heterogeneity and complexity of the promotional approaches used in practice it is difficult to come to a conclusion about successful elements that could be part of the approach. Studies adding a specific element to an existing approach, such as some of the studies described in paragraph 4.3.2, could be an interesting way to approach this. Our systematic review could be a source of promising elements to be further investigated in future studies. In addition, the approaches that were shown to be promising from this review should be tested to see if they are replicable and viable at larger scale.

Fourthly, since the scope of our systematic review was limited to handwashing and sanitation promotional approaches, we would like to make some suggestions for future systematic reviews. To be able to draw conclusions for all the different aspects of WASH interventions, information is needed about 1) the effect of water treatment and water supply programmes, 2) the effect of sanitation programmes on other outcomes such as latrine construction, latrine hygiene and latrine maintenance, and 3) the effect of programmes that aim to improve hygiene in a broader way than handwashing alone (e.g. menstrual hygiene).

A final suggestion for quantitative studies concerns cost-effectiveness. In addition to evidence on the effectiveness of WASH promotional programmes, evidence on cost-effectiveness is an aspect of major importance. It is already known that hygiene promotion is a cost-effective strategy in LMIC (> 10 USD per DALY averted) (Laxminaryan et al., 2006), however not much information is available on how this measure was determined and whether it includes health effects in the longer term. In order to achieve more sustainable effects with WASH programmes, more complex programmes (such as the promotional approaches described in the studies included in this review) have been developed, but it is not known if these are still cost-effective. Therefore, more primary research (and a systematic review in a second phase) on this subject is warranted.

The qualitative studies included in this review identified many factors that may influence the successful implementation of a certain promotional approach. This information can be used and further tested in future quantitative research. The heterogeneity of barriers and facilitators to implementation, highlights the importance of conducting qualitative process evaluations alongside trials in order to understand the dynamics of programme implementation. In addition, quantitative researchers should be encouraged to measure and report factors concerning process evaluation and implementation. Programme developers of WASH promotion programmes may also benefit from the qualitative study results by adopting of or anticipating on specific barriers/facilitators when developing their programme. Moreover, the identification of these implementation factors will guide researchers in which circumstances their programme may work (or not) and which barriers/facilitators they probably will need to tackle. Finally, researchers in the domain of WASH

promotion programmes can translate the information from the implementation factors to the specific context where the research will be conducted.

During this project active stakeholder engagement was part of the process and it was a real added value that researchers, practitioners, policy makers and donors were brought together at several moments. Therefore, we recommend stakeholder involvement both for the conduct of primary research (quantitative and qualitative studies), and the development of systematic reviews. In the context of this systematic review, stakeholders had an added value in: refining and approval of definitions (promotional approaches), fine-tuning the research questions and selection criteria, improving the ToC (increasing relevance to practitioners and policy makers), identifying relevant sources of grey literature, discussing about applicability of findings, formulating implications for practice, and thinking about dissemination and communication.

8 References

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9 Information about this review

9.1 REVIEW AUTHORS

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9.2 ROLES AND RESPONSIBILITIES

- Content: Hans-Joachim Mosler provided support concerning the content of WASH behaviour change.
- Systematic review methods: Hans Van Remoortel (reviewer 1) and Thashlin Govender/Selvan Naidoo (reviewer 2) performed study selection. Hans Van Remoortel and Selvan Naidoo performed data extraction of the quantitative studies. Emmy De Buck and Taryn Young provided support in case of discussion or disagreements. Hans Van Remoortel (reviewer 1) and Bert Avau (reviewer 2) performed data extraction and inductive coding for the qualitative studies. Karin Hannes provided support for the analysis of the qualitative studies. Philippe Vandekerckhove provided feedback in several stages of the project.
- Statistical analysis: Alfred Musekiwa, Emmy De Buck, Hans Van Remoortel and Bert Avau performed quantitative data analysis and synthesis.
- Information retrieval: The search strategy was developed by Vittoria Lutje.
- Link with Advisory Group: Axel Vande veegaete ensured that input from the Advisory Group was incorporated in the review, and that a Stakeholder Engagement and Communication Plan was developed. Emmy De Buck, Taryn Young, Hans Van Remoortel, Axel Vande

veegaete and Philippe Vandekerckhove participated in two stakeholder meetings. Thashlin Govender participated in the first stakeholder meeting.

- Writing: Emmy De Buck, Hans Van Remoortel, Bert Avau, Thashlin Govender, Selvan Naidoo and Taryn Young contributed to the writing of the review. All authors critically revised and approved the review text.
- Project coordination: Emmy De Buck coordinated the overall project.

9.3 SOURCES OF SUPPORT

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9.4 DECLARATIONS OF INTEREST

The authors are not aware of any conflicts of interest arising from financial or researcher interests.

9.5 PLANS FOR UPDATING THE REVIEW

The Centre of Evidence-Based Practice of Belgian Red Cross and the Centre for Evidence-Based Healthcare of Stellenbosch University will be responsible for updating this review as additional evidence accumulates and as funding becomes available.

9.6 AUTHOR DECLARATION

Authors' responsibilities

By completing this form, you accept responsibility for maintaining the review in light of new evidence, comments and criticisms, and other developments, and updating the review at least once every five years, or, if requested, transferring responsibility for maintaining the review to others as agreed with the Coordinating Group. If an update is not submitted according to agreed plans, or if we are unable to contact you for an extended period, the relevant Coordinating Group has the right to propose the update to alternative authors.

Publication in the Campbell Library

The Campbell Collaboration places no restrictions on publication of the findings of a Campbell systematic review in a more abbreviated form as a journal article either before or after the publication of the monograph version in *Campbell Systematic Reviews*. Some journals, however, have restrictions that preclude publication of findings that have been, or will be, reported elsewhere, and authors considering publication in such a journal should be aware of possible conflict with publication of the monograph version in *Campbell Systematic Reviews*. Publication in a journal after publication or in press status in *Campbell Systematic Reviews* should acknowledge the Campbell version and include a citation to it. Note that systematic reviews published in *Campbell Systematic Reviews* and co-registered with the Cochrane Collaboration may have additional requirements or restrictions for co-publication. Review authors accept responsibility for meeting any co-publication requirements.

I understand the commitment required to update a Campbell review, and agree to publish in the Campbell Library. Signed on behalf of the authors:

Form completed by: Emmy De Buck **Date:** 14 December 2016

10 Tables not included in main text

Table 1: Characteristics of included studies

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Abiola et al., 2012 Study date: January 2008-May 2008	Experimental: quasi-RCT	Region/country: Sub-Saharan Africa, Nigeria Target level: school Setting: rural Scale: small scale Sample size: 120 (intervention) vs 116 individuals (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention: health education intervention based on Health Belief Model (using both didactic and Socratic methods) one week after collection of baseline data and repeated after four weeks; no more details on content of education intervention provided • Comparison: no promotional approach Classification: sanitation and hygiene messaging	Primary outcomes: handwashing at key times* Secondary outcomes: knowledge (about hygiene), attitude (about hygiene) Timing of measurement of primary outcomes: 3 months after the end of implementation (adherence)
Andrade, 2013 Study date: 2008-2010	Quasi-experimental: non-RCT (mixed methods study)	Region/country: Latin America and Caribbean, El Salvador Target level: household, community Setting: rural	WASH component: WASH (general) Promotional approach: • Intervention: The intervention was implemented at the individual/household level, school level and community level. Individual/household level: hygiene promotion and education to each household at least twice a month (but varied on household need); visits of 10 to 30 minutes, depending on goal of visit; provision of support for modifying home as necessary to enable hygienic behaviours; in-home	Secondary outcomes: knowledge (handwashing, disease transmission)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
		Scale: large scale Sample size: 1163 individuals (intervention) vs 296 individuals (control)	skill-building, participatory demonstrations for handwashing, cooking, childcare, latrine maintenance and grey water disposal. All activities in the home were on an individual or group basis if family members were present. Education and assistance of families in learning the signs and symptoms of diarrheal disease and parasitism, mechanism for fluid replacement through oral rehydration salts, provision of referrals to clinic when necessary. School/community level: health promoters worked in 3 schools (grades 1-9) at least once a week with students doing various activities around topics like personal and household hygiene, dental hygiene and proper latrine habits. Time spent in schools ranges from 1-3 hours, depending on the activity. Giving classes to children (fun, participatory activities like games, poster contests, role-plays); giving presentations to parents at school-wide parent meetings; work with school directors to modify schools to enable good hygiene (latrine upgrades, modifying handwashing stations and water storage, evaluating kitchen practices of parents who cook school lunches. Community level: community-wide campaigns, e.g. trash clean-up brigades, deliver messages at community events such as religious services, soccer tournaments and community meetings. • Comparison: no promotional approach Classification: community-based approach	
Arnold et al., 2009 Study date: April 2007-June 2007	Observational: cohort study	Region/country: Latin-America and Carribean, Guatemala Target level: household Setting: rural Scale: small scale Sample size: 300 mothers, 474 children, 300 households, 15 villages	WASH component: water treatment, hygiene (handwashing) Promotional approach: • Intervention: "train the trainer" model, where NGO technicians trained local community women to promote the behaviour change through social marketing and household visits. The NGOs recruited approximately one community promoter per 25 participating households. The trained health promoters later visited households with children or pregnant mothers to promote water treatment and handwashing with soap. The visits occurred monthly or bi-monthly and lasted approximately 30 minutes each. Promoters educated mothers, and at the end of each visit gave the family a small ration of rice, beans and oil. • Comparison: no promotional approach Classification: social marketing approach	Primary outcomes: handwashing at key times*, safe faeces disposal (faeces observed)† Secondary outcomes: morbidity (diarrhoea, gastrointestinal illness, respiratory tract infections) Timing of measurement of primary outcomes: 6 months after the end of implementation (adherence)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
		(intervention) vs 300 mothers, 455 children, 300 households, 15 villages (control)		
Biran et al., 2009 Study date: study dates not reported	Experimental: cluster RCT	Region/country: South Asia, India Target level: household Setting: rural Scale: small scale Sample size: 143 (intervention) vs 145 households (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention: Hygiene promotion intervention modelled on an existing marketing campaign promoting the use of a commercial soap brand. The intervention was built around raising awareness of germs and of the importance of hygiene practices in preventing infection. The hygiene promotion intervention was delivered over 4 visits in 8 weeks (including school visits) by an intervention team of two trained communicators from a marketing agency with experience of commercial soap marketing. Part of the intervention was to work with incentives (exchange soap wrappers for gifts), organize an opinion leaders meeting and a hygiene day. • Comparison: no promotional approach Classification: social marketing approach	Primary outcomes: handwashing†, handwashing at key times† Secondary outcomes: skills (using one hand, both hands) Timing of measurement of primary outcomes: 2 months after the start of implementation (uptake)
Biran et al., 2014 Study date: May 2011-September 2012	Experimental: cluster RCT	Region/country: South Asia, India Target level: household Setting: rural Scale: small scale Sample size: 175 households (intervention) vs 173 households (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention: Intervention ("SuperAmma") based on emotional drivers of behaviour (nurture, disgust, affiliation, status and habit). The intervention consists of community and school-based events with the use of animated film, skits, public pledging ceremonies, household visits and school visits. • Comparison: no promotional approach during first 6 months; shortened version of the intervention during the last 6 months (month 6-12), based on elements shown to be promising. Classification: elements of psychosocial theory	Primary outcomes: handwashing at key times† Timing of measurement of primary outcomes: 6 weeks, 6 months, 12 months after the end of implementation (adherence)
Bowen et al., 2013	Experimental: cluster RCT	Region/country: South Asia, Pakistan	WASH component: hygiene (handwashing) Promotional approach:	Primary outcomes: handwashing at key times*

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Study date: 2009		Target level: household Setting: informal-rural Scale: small scale Sample size: 141 households (intervention 1), 160 households (intervention 2) vs 160 households (control)	• Intervention 1: Recipients of the handwashing intervention were given 90-g bars of generically packaged Safeguard® soap (Procter & Gamble, Mason, OH, USA) that was not imprinted with a brand or logo and were instructed to wash hands. Fieldworkers arranged neighbourhood meetings during which they used slide shows, videos and pamphlets to educate participants about health problems. Field workers encouraged adopting regular handwashing habits, but for this group neither encouraged nor discouraged drinking water treatment. • Intervention 2: Handwashing promotion and additional water treatment intervention. Field workers provided the supplies and instructions for both handwashing promotion and water treatment with flocculent-disinfectant. Field workers instructed study subjects to treat water with a flocculent-disinfectant. Field workers encouraged families to drink only treated water, but for this group they neither encouraged nor discouraged handwashing. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	Secondary outcomes: skills (using soap, rubbing hands at least 3 times, lathering hands at least 10 seconds, drying hands with a clean towel) Timing of measurement of primary outcomes: 5 years after the end of implementation (longer-term use)
Briceno et al., 2015 Study date: May 2012-December 2012	Experimental: cluster RCT	Region/country: Sub-Saharan Africa, Tanzania Target level: household Setting: rural Scale: large scale Sample size: 47 wards (intervention 1), 43 wards (intervention 2) 45 wards (intervention 3) vs 46 wards (control)	WASH component: hygiene (handwashing), sanitation Promotional approach: • Intervention 1: Handwashing wards were provided with a package of intensive social marketing interventions, including training of community activists, direct consumer contact through road shows, mass media campaigns and promotional activities, and technical assistance to build handwashing stations with local materials. • Intervention 2: Sanitation wards received a similar package of marketing efforts coupled with a community-led total sanitation triggering event geared towards increasing demand for improved sanitation facilities and promoting open defecation free (ODF) communities. • Intervention 3: Sanitation and handwashing wards • Comparison: no promotional approach Classification: social marketing approach	Primary outcomes: handwashing with soap†, handwashing at key times*†, latrine use*, safe faeces disposal (faeces observed) †, open defecation* Secondary outcomes: knowledge about handwashing, norms (awareness), morbidity (diarrhoea), mortality Timing of measurement of primary outcomes: 12 months after the end of implementation (longer-term use)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Cameron et al., 2013 Study date: 2008	Experimental: cluster RCT	Region/country: South-East Asia and Oceania, Indonesia Target level: village Setting: rural Scale: large scale Sample size: 80 villages (intervention) vs 80 villages (control) Total of 2087 households, 2353 children.	WASH component: sanitation Promotional approach: • Intervention: Total Sanitation and Sanitation Marketing campaign. The programmatic approach consists of three main components: 1) Community-Led Total Sanitation (CLTS). Facilitators are sent to communities to initiate analysis and discussions of the sanitation situation. These discussions are held in public places and are open to all. They involve a "walk of shame". 2) Social marketing of sanitation. This involves extensive consumer and market research that investigates the sanitation solutions that people desire. 3) Strengthening the Enabling Environment. This component aims to support the development of policies and institutional practices that facilitate scaling up, programme effectiveness, and sustainability. • Comparison: no promotional approach Classification: social marketing approach	Primary outcomes: handwashing at key times*, open defecation* Secondary outcomes: knowledge (about causes of diarrhoea), attitude (to open defecation), morbidity (diarrhoea, acute respiratory infection) Timing of measurement of primary outcomes: not reported (uptake)
Caruso et al., 2014 Study date: June 2010-November 2010	Experimental: cluster RCT	Region/country: Sub-Saharan Africa, Kenya Target level: school Setting: rural Scale: small scale Sample size: 5490 pupils, 20 schools (intervention 1), 6772 pupils, 20 schools (intervention 2) vs 5302 pupils, 20 schools (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention 1: Latrine Cleaning + Handwashing: Schools in the LC+HW arm received reusable hardware (buckets, brooms, hand brushes, plastic scoop), consumables (bleach, powdered soap), toilet tissue, handwashing materials, sheets for pupils to monitor latrines conditions daily and training for two teachers (the head teacher and health patron). methods for cleaning were demonstrated with all necessary supplies during the training. Teachers were provided with a step-by-step instruction sheet. • Intervention 2: Handwashing: same intervention but without latrine cleaning component • Comparison: no promotional approach Classification: sanitation and hygiene messaging	Primary outcomes: latrine use† Timing of measurement of primary outcomes: 1-5 months after the end of implementation (adherence)
Chase & Do, 2012	Experimental: cluster RCT	Region/country: South-East Asia and Oceania, Vietnam	WASH component: hygiene (handwashing) Promotional approach:	Primary outcomes: handwashing with soap*, handwashing at key times*

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Study date: September 2009-March 2011		Target level: community Setting: rural Scale: large scale Sample size: 2070 households (intervention) vs 1034 households (control)	• Intervention: a campaign based on the conceptual behaviour change framework FOAM (Focus on Opportunity, Ability and Motivation). The campaign was implemented with a major focus on communication, through a combination of mass media and interpersonal communication activities at the community level. The mass media component was composed of TV spots, including songs. The interpersonal communication activities consisted of training of handwashing motivators who then organized group meetings, household visits, loudspeaker announcements, festivals, contents and distribution of materials. • Comparison: same intervention with only the mass media component. Classification: elements of psychosocial theory	Secondary outcomes: morbidity (diarrhoea, acute respiratory infection) Timing of measurement of primary outcomes: 1-4 months after the end of implementation (adherence)
Contzen et al., 2015a, 2015b Study date: February 2012-March 2013	Quasi-experimental: non-RCT	Region/country: Sub-Saharan Africa, Ethiopia Target level: household Setting: rural Scale: small scale Sample size: 132 individuals, 17 hamlets (intervention 1), 164 individuals, 14 hamlets (intervention 2), 118 individuals, 19 hamlets (intervention 3) vs 25 individuals, 4 hamlets (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention 1: Education intervention with implementation of an f-diagram, a graph illustrating the transmission routes of diarrhoea. The tool was applied as a group sorting task at a 1-h community meeting. In addition, there was a focus on public commitment (based on psychosocial theory). Two-hour community meetings were organized during which first the education intervention was implemented as part of the commitment meeting and second primary caregivers were asked to give oral statements of their commitment. A commitment sign, a headscarf to be worn, and a commitment certificate to be pinned up were handed out. • Intervention 2: The same education intervention as for Intervention 1. In addition, infrastructure promotion was implemented. Households were invited and motivated during home visits to construct a handwashing station (Tippy Tap) for their household. Right after a 1-h community meeting which demonstrated the construction, the promoters, distributed jerry cans required for the handwashing station. • Intervention 3: The same education intervention as for Intervention 1, but with the public commitment element of intervention 2 and infrastructure promotion element of intervention 3. • Comparison: Only the education component	Primary outcomes: handwashing* Secondary outcomes: skills (impediments), norms, self-regulation (commitment strength, forgetting, self-efficacy)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
			Classification: elements of psychosocial theory	
Dickey et al., 2015 Study date: 2011	Quasi-experimental: non-RCT	Region/country: East Asia, China Target level: village Setting: rural Scale: small scale Sample size: 2 villages (intervention) vs 2 villages (control)	WASH component: sanitation Promotional approach: • Intervention: "Local-builder social marketing approach": Three-chamber septic tank systems were used (preference of the villagers). Subsidies were given as part of the social marketing campaign. Each household decided where to place their toilet. An outside independent expert from the provincial capital had to ensure that the campaign was compliant with government criteria, and based on focus group discussions. The main motivations for building a toilet were determined and used to promote toilets. • Comparison: "outside-expert building team": Each household could choose either a three-chamber or a urine-diverted double-urn system. Subsidies were given as part of the social marketing campaign. Although each household could select the location of the toilet, all three-chamber septic tanks and outhouse structures and all urine-diverted double urn toilet structures were basically identical. The toilets were placed rather than built. The level of government financial support was much greater in the comparison villages than in the intervention villages. Classification: social marketing	Primary outcomes: latrine use* Timing of measurement of primary outcomes: not reported (uptake)
Galiani et al., 2012, 2015 Study date: May 2008-June 2011	Experimental: cluster RCT	Region/country: Latin America and Caribbean, Peru Target level: school, community Setting: rural Scale: large scale Sample size: 44 districts, per district: 15-20 households with a child < 2 years old and a sibling who	WASH component: hygiene (handwashing) Promotional approach: • Intervention 1: Province level intervention, mass media plus direct consumer contact treatment. Radio spots, printed materials, cartoon character. Additionally, promotional events such as street parades, games and local theatre performances were conducted in public areas. The campaign emphasized the importance of the availability and use of soap for handwashing and of handwashing at key times. • Intervention 2: District level intervention, community treatment. The intervention was based on commercial and social marketing techniques and was composed of: a mass media plus a direct consumer contact campaign, training of community agents (teachers, medical professionals, community leaders), capacity-building (educational handwashing sessions) for mothers, caregivers, and children, and	Primary outcomes: handwashing at key times*† Secondary outcomes: knowledge about handwashing, morbidity (diarrhoea, respiratory infections) Timing of measurement of primary outcomes: 4 months after the end of implementation (adherence)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
		attended the main treated school 20 households x 41 districts = 820 households (intervention 1); 44 districts, per district: 15-20 households with a child < 2 years old and a sibling who attended the main treated school 20 households x 44 districts = 880 households (intervention 2) vs 41 districts, per district: 15-20 households with a child < 2 years old and another 15-20 households with a child < 2 years old and a sibling who attended the main treated school = 30-40 households per district. 40 households x 41 districts = 1640 households (control)	handwashing promotion as part of primary school curricula. In the districts that received the community treatment, a school level treatment was delivered to the main primary schools in each district. The activities in schools included designating a place in the classroom for soap, performing regular handwashing practices in groups each day, weekly handwashing promotion classes, and other children's activities such as singing songs and drawing posters. • Comparison: no promotional approach Classification: social marketing approach	
Graves et al., 2011	Experimental: cluster RCT	Region/country: Sub-Saharan Africa, Kenya Target level: school	WASH component: hygiene (handwashing) Promotional approach: • Intervention: Children from the intervention schools are encouraged to design their own posters to promote handwashing with soap in school	Primary outcomes: handwashing at key times† Timing of measurement of primary outcomes: 4 months

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Study date: October 2008-March 2009		Setting: rural Scale: small scale Sample size: 11 schools (intervention) vs 12 schools (control)	and at home, through providing poster paper, crayons and information on handwashing. A contest is organised and the best poster or slogan from each school is selected to be printed and distributed amongst the intervention schools, through which a poster is available for each classroom and the teacher's lounge. This intervention was implemented on top of the NICHE (Nyando Integrated Child Health Education) project, which is further elaborated in the control group. • Comparison: Two teachers from each school were trained in a handwashing programme that included the use of the Safe Water System (SWS) at schools; these teachers were encouraged to establish SWS and pupil-focused Safe Water Clubs. NICHE provided containers for safe water storage, soap for handwashing, water treatment supplies, and low-cost, locally available materials to set up handwashing water stations. Each school received educational manuals on handwashing and hygiene at the beginning of the NICHE intervention. Beginning one year after the implementation of SWS by NICHE at the schools, the schools were expected to continue the intervention independently of NICHE support, including self-financing of the programme. Schools were monitored throughout the year for use of the SWS by pupils and teachers. Classification: sanitation and hygiene messaging	after the end of implementation (adherence)
Guiteras et al., 2015a Study date: study dates not reported	Experimental: cluster RCT	Region/country: South Asia, Bangladesh Target level: compound Setting: urban Scale: small scale Sample size: 420 households, 210 compounds (intervention) vs 214 compounds (control)	WASH component: hygiene (handwashing), water treatment Promotional approach: • Intervention: Educational approach, combined with behaviour change messages designed to elicit to elicit disgust that untreated drinking water had shit in it, and fear of shame if they did not treat drinking water. The educational intervention was embedded in a broader intervention consisting of infrastructure promotion, a free trial of water treatment and handwashing hardware (chlorine dispenser, soapy water bottle, detergent), reminder visits, sales coaching and a sales offer (giving the opportunity to purchase hardware for a fee ("sales meeting")). • Comparison: educational approach alone, classic public health messages focusing on germs and health Classification: sanitation and hygiene messaging	Primary outcomes: handwashing at key times* Secondary outcomes: attitude (feeling of disgust) Timing of measurement of primary outcomes: not reported (uptake)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Guiteras et al., 2015b Study date: 2012-2013	Experimental: cluster RCT	Region/country: South Asia, Bangladesh Target level: neighborhood Setting: rural Scale: large scale Sample size: 49 neighborhoods (intervention 1), 115 neighborhoods (intervention 2), 34 neighborhoods (intervention 3), 116 neighborhoods (intervention 4) vs 66 neighborhoods (control)	WASH component: sanitation Promotional approach: • Intervention 1 (Latrine promotion program): The Latrine Promotion Program (LPP) was a multi-day, neighborhood-level exercise designed to raise awareness about the problems caused by open defecation (OD) and nonhygienic latrines, and to motivate the community to reduce open defecation and increase coverage of hygienic latrines. The primary activities are similar to those of Community-Led Total Sanitation (CLTS), which was developed by VERC in Bangladesh and subsequently implemented in many countries in Asia and Africa. CLTS programs inform households about the health threats associated with open defecation (OD) and the economic benefits associated with latrine investments, attempt to make the health and disease transmission risks more salient through demonstration, and encourage all members of the community to make a joint commitment to invest and become open defecation free. • Intervention 2 (LPP + subsidy): The neighborhoods received LPP (see above) + were subsididized and further randomized into one of three sub-treatments which varied the share of eligible households assigned the subsidy vouchers. We call these “Low”, “Medium” and “High” intensity, corresponding to approximately 25%, 50% and 75% of eligible households receiving vouchers. The latrine vouchers offered a 75% discount on the components of any of three models of hygienic latrine. All models included a ceramic pan, lid and water seal, and met the standard criteria for hygienic if properly installed and maintained. • Intervention 3 (Supply only): a community-level intervention intended to improve the functioning of the sanitation market. VERC identified, trained and hired individuals in randomly chosen neighborhoods to work as Latrine Supply Agents (LSAs) in that neighborhood. VERC recruited residents who worked in fields such as masonry, construction or carpentry, and therefore were likely to have adequate technical ability and knowledge. • Intervention 4 (LPP + Supply + Subsidy): see above • Comparison: no promotional approach Classification: community-based approach	Primary outcomes: open defecation* Timing of measurement of primary outcomes: 10 months after the end of implementation (adherence, intervention 3/4), 11 months after the end of implementation (adherence, intervention 2), 13 months after the end of implementation (longer-term use, intervention 1)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Hoque et al., 1994, 1996 Study date: 1984-1987	Experimental: RCT	Region/country: South Asia, Bangladesh Target level: household, village Setting: rural Scale: small scale Sample size: 3840 individuals, 617 households (intervention) vs 2852 individuals, 451 households (control)	WASH component: sanitation Promotional approach: • Intervention: Water and sanitation project, as part of the Mirzapur handpump project. People were provided with handpumps, latrines and hygiene education. In the intervention area, housewives were directly involved in the site selection of handpumps and latrines, their installation, construction, and maintenance. The project workers maintained a close advisory relationship. The households were given the responsibility to supervise the installation of the latrines which was done by hired contractors. The contractor was paid only after a satisfactory completion report was received from the housewife of the respective household, followed by a similar report from the project workers. • Comparison: no promotional approach Classification: community-based approach	Primary outcomes: latrine use* Secondary outcomes: morbidity (diarrhoea) Timing of measurement of primary outcomes: 5 years after the end of implementation (longer-term use)
Huda et al., 2012 Study date: 2007-2011	Experimental: cluster RCT	Region/country: South Asia, Bangladesh Target level: community Setting: rural Scale: large scale Sample size: 4833 individuals, 848 households (intervention) vs 4473 individuals, 844 households (control)	WASH component: hygiene (handwashing), sanitation and water quality Promotional approach: • Intervention: More than 10 000 local residents were trained for 10 days by local NGOs on behaviour change communication materials related to water, sanitation and hygiene, to become community hygiene promoters. They were engaged to develop their own community action plans, including targets for improvements in latrine coverage and usage, access to and use of arsenic-free water and improved hygiene practices, especially handwashing with soap. The community hygiene promoters visited households, facilitated courtyard meetings and organized social mobilization activities. These included water, sanitation and hygiene fairs, village theatre and group discussions in tea stalls, the social meeting point for village men. Incentives for the community hygiene promotors included prestige as well as a modest salary, approximately 1 US dollar per day, which is approximately one half that of an unskilled laborer. • Comparison: no promotional approach Classification: community-based approach	Primary outcomes: handwashing at key times†, safe faeces disposal* Secondary outcomes: morbidity (diarrhoea) Timing of measurement of primary outcomes: 18 months after the end of implementation (longer-term use)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Jinadu et al., 2007 Study date: study dates not reported	Experimental: RCT	Region/country: Sub-Saharan Africa, Nigeria Target level: household Setting: rural Scale: small scale Sample size: 262 women with children < 5 years, 155 households of women with children < 5 years (intervention) vs 252 women, 145 households of women with children < 5 years (control)	WASH component: hygiene (handwashing), sanitation Promotional approach: • Intervention: An intervention development workshop was organized for community leaders, primary health care workers, educational workers and community mobilization officers from the intervention communities, who developed the EDEE Intervention Package, based on findings from a baseline survey, information from health services, personal experience. The EDEE Intervention package was implemented by the primary health care workers of the intervention villages after a series of capacity-building workshops. The intervention lasted for 9 months and consisted mainly of (a) small-group and individual discussions with demonstrations to pregnant women and mothers of children under five years old in the primary health centres and community centres, (b) discussion with and demonstrations to mixed audiences in the communities. • Comparison: no promotional approach Classification: community-based approach	Primary outcomes: handwashing at key times†, latrine use†, safe faeces disposal (child faeces disposal, faeces lying around)† Timing of measurement of primary outcomes: 3 months after the end of implementation (adherence)
Kaewchana et al., 2012 Study date: April 2008-July 2009	Experimental: RCT	Region/country: South-East Asia and Oceania, Thailand Target level: household Setting: urban Scale: small scale Sample size: FHW (Frequency of handwashing) and KAP (knowledge, attitude and practice): 140 individuals, QHW	WASH component: hygiene (handwashing) Promotional approach: • Intervention: The intervention household members received a 30-minute intensive handwashing education on influenza infection, potential impacts, for example, school and work absenteeism and income loss while caring for an influenza-infected child, the benefits of handwashing and individual training on handwashing technique on day 0/1. The study staff repeatedly provided individual training on handwashing technique and conveyed memorizing messages about “why to wash,” “when to wash,” “how to wash,” and “how handwashing is linked to influenza transmission” during the subsequent home visits on day 3 and 7. Additionally, intervention household members were asked to record frequency of handwashing daily (self- monitoring diary) and received handwashing supplies (liquid plain soap and dispenser) for the 90-day period, as well as written materials that included pamphlets and posters	Primary outcomes: handwashing* Timing of measurement of primary outcomes: 7 days after the start of implementation (uptake)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
		(quality of handwashing): 160 individuals (intervention) vs FHW and KAP: 135 individuals, QHW: 166 individuals (control)	on handwashing technique that was attached near washing sinks in the households. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	
Kochurani et al., 2009 Study date: 2006-2007	Quasi-experimental: non-RCT	Region/country: South Asia, India Target level: school Setting: no information Scale: large scale Sample size: 4105 children, 320 households, 150 schools (intervention) vs 3730 children, 444 households, 150 schools (control)	WASH component: WASH (general) Promotional approach: • Intervention: 1) UNICEF-supported School Sanitation and Hygiene Education (1999-2003). Combination of hardware and software inputs provided in a fixed time frame of one year or more per school. More than 25% of funding was earmarked for training and health camps. This was part of the UNICEF-supported programme for water and sanitation against communicable disease. Maintenance of services was emphasized through school health club members, parent-teacher associations and teachers. School health clubs were formed and trained to help with school activities, help organize children and outreach into the communities. The various activities of the clubs included special meetings, cleaning of facilities and classrooms, village adoption programmes and classes on personal hygiene, safe drinking water and environmental sanitation. 2) Nirmal 2000 (1999-2003). A parallel project for universal community and household sanitation (i.e. one of the pilots for the national total sanitation programme). Nirmal 2000 had a school component which was similar to the UNICEF school programme. These 2 interventions wound down in 2002, ending in 2003, about 4 years before the present study. 3) Projects after 2002 in all three districts. Three nationally-sponsored programmes: - Total Sanitation Campaign in which there were some inputs for schools. Schools were seen as one vehicle for improving sanitation behaviours of the younger generation while, at the same time, reaching into the community to stimulate improved household sanitation.	Primary outcomes: handwashing at key times*, open defecation* Secondary outcomes: knowledge (about handwashing, health reasons) Timing of measurement of primary outcomes: 48 months after the end of implementation (longer-term use)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
			- SarvaShikshaAbhiyan is an effort to universalize elementary education by community-ownership of the school system and includes funds which can be used for toilets. - Swajaldhara (2003) local water supply, also a national programme, can also be used for school water supply. None of these programmes has a specialized capacity or intervening agency specifically for schools. Furthermore, the focus of these less intensive interventions tends to be primarily on construction of water and/or sanitation facilities. • Comparison: no promotional approach Classification: community-based approach	
Langford & Panter-Brick, 2013 Study date: 2005	Experimental: quasi-RCT (mixed methods study)	Region/country: South Asia, Nepal Target level: household Setting: informal-rural Scale: small scale Sample size: 45 child-mother pairs (intervention) vs 43 child-mother pairs (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention: Handwashing programme intervention that was underpinned by the Theory of Planned Behavior. The programme was launched in intervention areas at a community meeting organized in each local area. This meeting included an interactive educational session, a discussion led by the Community Motivator, and a short play, commissioned specifically for this intervention and performed by actors from the slum communities. The intervention was then intensively promoted for six months. The launch meeting was followed up by daily home visits by Community Motivators to each mother to encourage the establishment of a new hand-washing regime. These visits continued on a daily basis for two weeks, and then decreased in frequency until the mothers were visited just once or twice a week throughout the six-month intervention period. Mothers' group meetings were held in each area, with their local Community Motivator, every two weeks throughout the study period. The Community Motivators distributed a new bar of soap to each mother at these meetings to encourage handwashing practices in the family. Locally designed posters were distributed to all families in the intervention areas and were displayed prominently throughout the settlements. • Comparison: no promotional approach Classification: elements of psychosocial theory	Primary outcomes: handwashing at key times* Secondary outcomes: morbidity (diarrhoea) Timing of measurement of primary outcomes: 4 months after the start of implementation (uptake)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Lansdown et al., 2002 Study date: March 1998-February 1999	Experimental: RCT (mixed methods study)	Region/country: Sub-Saharan Africa, Tanzania Target level: school Setting: rural Scale: small scale Sample size: 168 individuals, 25 schools (intervention) vs 112 individuals, 25 schools (control)	WASH component: WASH (general) Promotional approach: • Intervention: Educational intervention. School teachers were introduced to active teaching methods as well as being given some knowledge on parasitology and ways of preventing infection. After returning to their schools, teachers widened their work to include the importance of clean drinking water and good nutrition. In some schools the prevention of locally common diseases was taught. Songs, poetic dramas, short plays, visits and discussions were commonly used. All but one of the schools had motto boards or daily message boards. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	Primary outcomes: open defecation* Secondary outcomes: knowledge (health: disease causation and prevention) Timing of measurement of primary outcomes: 9 months after the start of implementation and 15 months after the end of implementation (uptake-longer-term use)
Lhakhang et al., 2015 Study date: March 2013-April 2013	Experimental: quasi-RCT	Region/country: South Asia, India Target level: individual Setting: urban Scale: small scale Sample size: 94 individuals (intervention) vs 112 individuals (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention: a motivational intervention followed by a self-regulatory intervention. Motivational intervention: This intervention was focused on risk perception and outcome expectancies. The participants received a module with detailed instructions on why and how to wash hands, information addressing risk perception and positive outcome expectancies as well as prompts towards intention formation. After providing general information about the behavioural risk, participants were instructed to anticipate risks of not washing their hands properly and were encouraged to write down benefits of washing hands (positive outcome expectancies). Self-regulatory intervention: This intervention was focused on self-efficacy, and planning. After general instruction, participants were encouraged to generate three action plans, specifying the timing, frequency, and technique to wash their hands, and three coping plans, which included both barrier identification and problem-solving. Next, participants were instructed to rate their perceived ability to follow through with the plan on a 4-point scale. • Comparison: the same intervention, but first the self-regulatory element was provided, followed by the motivational element. Classification: elements of psychosocial theory	Primary outcomes: handwashing*, intention to wash hands* Secondary outcomes: self-regulation (self-efficacy, planning) Timing of measurement of primary outcomes: 17 days and 34 days after the start of implementation (uptake)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Luby et al., 2009 Study date: July 2005-September 2006	Experimental: cluster RCT	Region/country: South Asia, Pakistan Target level: household Setting: informal-rural Scale: small scale Sample size: 186 households (intervention 1), 195 households (intervention 2) vs 195 households (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention 1: Handwashing promotion. Recipients of the handwashing intervention were given 90-g bars of generically packaged Safeguard® soap (Procter & Gamble, Mason, OH, USA) that was not imprinted with a brand or logo and were instructed to wash hands. Fieldworkers arranged neighbourhood meetings during which they used slide shows, videos and pamphlets to educate participants about health problems. Field workers encouraged adopting regular handwashing habits, but for this group neither encouraged nor discouraged drinking water treatment. • Intervention 2: Handwashing promotion and additional water treatment intervention. Field workers provided the supplies and instructions for both handwashing promotion and water treatment with flocculent-disinfectant. Field workers instructed study subjects to treat water with a flocculent-disinfectant. Field workers encouraged families to drink only treated water, but for this group they neither encouraged nor discouraged handwashing. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	Primary outcomes: handwashing with soap* Secondary outcomes: skills (using soap, rubbing hands at least 3 times, lathering hands at least 10 seconds, drying hands with a clean towel) Timing of measurement of primary outcomes: 18 months after the end of implementation (longer-term use)
Luby et al., 2010 Study date: February 2008-November 2010	Experimental: cluster RCT	Region/country: South Asia, Bangladesh Target level: compound Setting: rural Scale: small scale Sample size: 234 individuals (intervention 1), 211 individuals (intervention 2) vs 247 individuals (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention 1: Soap intervention. The intervention programme was based on the stages of change theory. Field workers asked compound members in intervention compounds whether they wanted to change their handwashing behaviour and, if so, how they wanted to change it. The goal of this initial session was to move compound members from the pre-contemplation stage to the contemplation stage for improved hand hygiene. Next, the field staff introduced bar soap (Lux) and explained how to use it. Field staff placed the soap or waterless hand sanitizer throughout the compound. The objective of this session was to move compound members from the contemplation stage to the preparation for action stage. • Intervention 2: Hand sanitizer intervention. The same intervention as Intervention 1, but with the introduction of a waterless hand sanitizer	Primary outcomes: handwashing at key times† Timing of measurement of primary outcomes: 4 months after the start of implementation (uptake-adherence)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
			(First Defence, a commercial product marketed in Europe that does not use alcohol, but uses organic acids to reduce the pH of skin). • Comparison: no promotional approach Classification: elements of psychosocial theory	
Mascie-Taylor et al., 2003 Study date: study dates not reported	Experimental:quasi-RCT	Region/country: South Asia, Bangladesh Target level: household Setting: rural Scale: small scale Sample size: 1073 households (intervention) vs 1076 households (control)	WASH component: hygiene (handwashing), sanitation Promotional approach: • Intervention: Educational approach, which aimed to increase the awareness of worm transmission and the disabilities caused by intestinal helminths; to improve personal hygiene by washing one's hands before eating and preparing food and after defecation. Further aims were to encourage regular nail trimming, and to promote routine wearing of shoes, use of a latrine, and use of clean water in cooking and washing of utensils. The educational package comprised home visits once a month, focus group discussions, and visits to schools. The project did not provide any funds for construction of latrines, drilling of tube-wells or personal hygiene. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	Primary outcomes: handwashing* Secondary outcomes: knowledge (worms and health) Timing of measurement of primary outcomes: 18 months after the start of implementation (uptake)
Patil et al., 2013, 2015 Study date: May 2009-April 2011	Experimental: cluster RCT	Region/country: South Asia, India Target level: household, village Setting: rural Scale: large scale Sample size: 1683 individuals, 976 households, 40 villages (intervention) vs 1707 individuals,	WASH component: sanitation Promotional approach: • Intervention: India's Total Sanitation Campaign (TSC) was launched in 1999. India's TSC used principles of community-led total sanitation to motivate private toilet construction by attempting to change community norms around open defecation. The methodology involves a series of community ''triggering'' exercises, led by an external facilitator after building rapport with the community in the pre-triggering phase, which highlight the magnitude of the practice of open defecation, elicit shame and disgust, and mobilize community action to end open defecation. TSC also provided financial incentives for local governments to achieve high levels of coverage, and subsidies for households to offset the capital costs of toilets.	Primary outcomes: open defecation*, faeces disposal (child faeces disposal, faeces observed)* Secondary outcomes: morbidity (diarrhoea, gastrointestinal illness, respiratory illness) Timing of measurement of primary outcomes: 21 months after the start of implementation (uptake)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
		978 households, 40 villages (control)	• Comparison: no promotional approach Classification: community-based approach	
Pattanayak et al., 2009 Study date: July 2005-September 2006	Experimental: cluster RCT	Region/country: South Asia, India Target level: village Setting: rural Scale: large scale Sample size: 534 households, 20 villages (intervention) vs 552 households, 20 villages (control)	WASH component: sanitation Promotional approach: • Intervention: The IEC (Information, Education and Communication) campaign is a community-based project that aimed to improve attitudes and knowledge about how sanitation, safe water and hygiene related to health. It also acknowledges the role of small subsidies in encouraging the poor to construct individual household latrines. Campaigns typically lasted from 1 to 2 months between February and April 2006. To ensure that social mobilization was conducted with sensitivity to local customs, in each village a local community-based organization – the implementing agency – helped the community to establish systems of fines, taunting or social sanctions to punish those who continued to defecate in the open. The local government helped these organizations to establish sanitation marts, produce latrine components in the village and provide know-how on latrine engineering. • Comparison: no promotional approach Classification: community-based approach	Primary outcomes: latrine use* Timing of measurement of primary outcomes: 3 months after the end of implementation (adherence)
Phuanukoonnon et al., 2013 Study date: September 2012-May 2013	Experimental: quasi-RCT	Region/country: South-East Asia and Oceania, Papua New Guinea Target level: household Setting: rural Scale: small scale Sample size: 314 households (intervention) vs 81 households (control)	WASH component: WASH (general) Promotional approach: • Intervention: Trained community-based volunteers called healthy men/women ('helti man'/'helti meri') distributed WASH kits, consisting of a bucket with a tap to store drinking water, 30 water purification tablets (Aquatabs® with the active ingredient sodium dichloroisocyanurate), 2 bars of soap, 2 sachets of oral rehydration salts (ORS) and 10 tablets of zinc for treating diarrhoea, and an information, education and communication (IEC) brochure. These trained volunteers then educated local communities in the use of the kits as well as resupplying ORS, zinc and water treatment tablets. The WASH kit included enough contents to last for 1 month, with resupply given monthly.	Primary outcomes: handwashing at key times* Secondary outcomes: knowledge (causes and consequences of diarrhoea, germs) Timing of measurement of primary outcomes: 9 months after the end of implementation (adherence)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
			• Comparison: no promotional approach Classification: community-based approach	
Pickering et al., 2013 Study date: study dates not reported	Experimental: cluster RCT	Region/country: Sub-Saharan Africa, Kenya Target level: school Setting: urban Scale: small scale Sample size: 435 individuals, 2 schools (intervention 1), 460 individuals, 2 schools (intervention 2) vs 469 individuals, 2 schools (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention 1: Hand sanitizer intervention. Hygiene interventions consisted of an initial teacher training session followed by the installation of sanitizer wall dispensers. Each of the schools received two dispensers, one of which was installed next to the toilets and one of which was installed near the eating area. The sanitizer product and sanitizer dispensers were imported from a US company (Purell sanitizer; GoJo Industries Inc., Akron, OH). The sanitizer dispensers automatically dispensed product when hands were placed underneath the motion sensor. Each intervention school was visited daily by field staff (enumerators) to replenish the dispensers throughout the study period. The teacher training session included a participatory discussion with teachers on germ theory and hand hygiene, demonstration and practice of correct sanitizing method, and distribution of a culturally appropriate student hand hygiene promotion kit (designed by UNICEF). The kit included posters, stickers, a classroom activity book, and a DVD presentation on handwashing along with a promotional song. • Intervention 2: Soap intervention. The same intervention as in Intervention 1, but promoting soap instead of hand sanitizer. Schools provided with soap also received a plastic 60-L water tank with a spigot mounted on a metal stand (Polytanks, Nairobi, Kenya). Handwashing soap and soap dispensers were purchased locally in Nairobi (Primark Trading Company, Nairobi, Kenya). Soap dispensers were manually operated by pulling a lever. • Comparison: no promotional approach Classification: sanitation and hygiene messaging (control schools did not receive training sessions or hygiene kits).	Primary outcomes: handwashing with soap*, handwashing at key times* Secondary outcomes: morbidity (diarrhoea), mortality Timing of measurement of primary outcomes: not reported (uptake)
Pickering et al., 2015	Experimental: cluster RCT	Region/country: Sub-Saharan Africa, Mali	WASH component: sanitation Promotional approach:	Primary outcomes: handwashing with soap†, latrine/potty use†, safe faeces disposal (faeces in

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Study date: April 2011-June 2013		Target level: village Setting: rural Scale: large scale Sample size: 2365 households, 60 villages (intervention) vs 2166 households, 61 villages (control)	• Intervention: Community-led total sanitation (CLTS) programme. Triggering session where programme facilitators completed following activities: welcoming the community, completing instructions, drawing of a map of defecation areas in village, calculating quantity of faeces produced by village per year, calculating expenditures on health-care costs; leading a walk to view open defecation areas in village (walk of shame), showing flies landing on fresh faeces and then on food; asking individuals to commit to building latrines and stop practice of open defecation: helping to form a village sanitation committee; explaining CLTS open defecation free competition rules and setting target date for village to become free of open defecation. Triggering sessions and public commitments made by each villager to comply with interventions were filmed. Each village was subsequently visited by CLTS programme staff every 2-4 weeks to monitor progress until certification was granted. Programme provided no subsidies for latrine building and encouraged latrine designs built with local and available materials. One week after triggering session, 3 representatives from the sanitation committee in each village were invited to a central location to attend a meeting ("marketplace"): representatives filled out charts for their village detailing number of latrines built, number of latrines needed and target date for village to become certified as open defecation free. • Comparison: no promotional approach Classification: community-based approach	compound) †, open defecation* Timing of measurement of primary outcomes: 18 months after the end of implementation (longer-term use)
Pinfold, 1999 Study date: study dates not reported	Quasi-experimental: non-RCT	Region/country: South-East Asia and Oceania, Thailand Target level: school Setting: no information Scale: large scale Sample size: 16568 individuals, 25 villages, 20 schools	WASH component: hygiene (handwashing) Promotional approach: • Intervention: Media (posters, stickers, leaflets, comic books, songs, slide show, T-shirts, badges) was developed to create awareness and support activities promoting behaviours. Printed media was illustrated so the illiterate could understand messages. Project logo provided continuity. Songs about hygiene messages were recorded in traditional folk music. Tapes of this, and the community-produced play, were broadcast over village loudspeaker towers. A Slide show demonstrated the effect of handwashing on germs by using	Secondary outcomes: knowledge (about handwashing and dishwashing)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
		(intervention) vs 8092 individuals, 12 villages, 13 schools (control)	photographs of bacterial plates used for hand-washing indicator and cartoons of germs similar to that used in other media. Actual bacterial plates were handed round after the show to help stimulate more discussion. Handwashing containers developed for the intervention were adorned with stickers and distributed to homes with young children (<5 years) in selected villages. Children were involved in activities specifically designed to bring messages to village such as poster competitions where their pictures were displayed at home and at prominent places around the village (prize-winners). • Comparison: no promotional approach Classification: social marketing approach	
Seimetz et al., 2016 Study date: study dates not reported	Observational: cohort study	Region/country: South Asia, India Target level: village Setting: rural Scale: large scale Sample size: 687 individuals	WASH component: hygiene (handwashing), sanitation Promotional approach: • Intervention: The Great WASH Yatra handwashing awareness raising campaign. A set of interactive educational games and activities were developed, inspired by cricket, Bollywood song and dance, parlour games and popular Indian TV formats to promote handwashing behaviour. Importance of handwashing was reinforced at each activity and messages were on-site disseminated through a movie, posters, flyers and onstage activities. Song, dance, theatre, art and games were themed and aligned around a unique narrative involving hygiene heroes and spreading the message of clean water and sanitation for all. The game zone comprised nearly 20 games, designed to communicate one or more of the core messages: the necessity to use toilets and to wash hands with soap. The core message of about half of the activities was to discourage open defecation and to promote the use of toilets. Each respondent who participated in both the pre- and the post-interview received three bars of soap as an incentive. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	Primary outcomes: intention to wash hands with soap* Secondary outcomes: knowledge (health, risks), skills (ability factors), attitude (instrumental beliefs, affective beliefs), norms, self-regulation (action control, commitment) Timing of measurement of primary outcomes: not reported (uptake)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Stanton & Clemens, 1987 Study date: October 1984-October 1985	Experimental: cluster RCT	Region/country: South Asia, Bangladesh Target level: community Setting: urban Scale: large scale Sample size: 937 households (intervention) vs 986 households (control)	WASH component: hygiene (handwashing), sanitation Promotional approach: • Intervention: Educational messages emphasizing proper handwashing before food preparation, defecation away from the house and in a proper site, and suitable disposal of waste and faeces, thus preventing access to waste products by young children. Messages formed the basis of an intensive training programme conducted for 8 weeks. Intervention approach included small-group discussions including only women and only children, larger demonstrations to mixed audiences and community-wide planning and action meetings which included husbands. Posters, games, pictorial stories and 'flexiflans' (flannel board with movable characters) were developed by trainers and community members to illustrate the messages. After 8 weeks of intensive training, one trainer and community health workers continued to reinforce the educational messages through new stories, games and community organization in all 25 communities. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	Primary outcomes: handwashing at key times†, open defecation† Timing of measurement of primary outcomes: 6 months after the end of implementation (adherence)
Tumwebaze & Mosler, 2015 Study date: August 2013-September 2013	Experimental: cluster RCT	Region/country: Sub-Saharan Africa, Uganda Target level: household Setting: informal-rural Scale: small scale Sample size: 38 households (intervention 1), 41 households (intervention 2) vs	WASH component: hygiene (handwashing), sanitation Promotional approach: • Intervention 1: Discussions were facilitated by local leaders or village health workers in the study areas. The content of the discussions followed both the behaviour change techniques indicated in the RANAS model of behaviour change and those suggested in other studies. At the end of each meeting, the participants were given a small sachet of washing powder in return for their participation. Each of the discussions lasted between 30 min and 1 h. • Intervention 2: Same as in Intervention 1, but with an additional public commitment component: Each of the participants made a public pledge after the discussion committing their participation and that of other household members to cleaning their shared sanitation facilities. The public commitment was expressed by the participant by signing a	Secondary outcomes: knowledge (disease vulnerability, severity), skills (cooperation confidence, cleaning ease, cleaning roster), attitude (cleaning affect, cleaning effort, time cost), norms (cleaning approval), self-regulation (cleaning habit, routine, cleaning obligation, remembering, perceived commitment)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
		40 households (control)	commitment form and other discussion participants appending their signatures as witnesses. The signed form remained with the participant. • Comparison: no promotional approach Classification: elements of psychosocial theory	
Wang et al., 2013 Study date: April 2009-June 2009	Experimental: cluster RCT	Region/country: East Asia, China Target level: village Setting: rural Scale: large scale Sample size: 358 individuals, 13 villages (intervention) vs 348 individuals, 15 villages (control)	WASH component: WASH (general) Promotional approach: • Intervention: Health education intervention: 2 sessions in April and late June of 2009. Class-based and led by trained staff from Sichuan Center for Disease Control (Sichuan CDC) and Prevention. Poster and display boards designed by Chinese Ministry of Health and Sichuan CDC were put up 15 min before class. Informal tutoring was made available to interested participants. Formal tutoring: brief outline of format and contents of class, followed by verbal presentation that elaborated on transmission, prevention, protection and treatment of schistosomiasis. An educational video produced by China CDC was played in the first class, prize-winning quizzes regarding some of the key points were conducted in second class. Educational materials, including pamphlets, towels, schoolbags and other small items that had schistosomiasis-relevant knowledge printed thereon were given to each household. Each class lasted for 1-1.5h. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	Primary outcomes: open defecation* Methods of outcome assessment: Timing of measurement of primary outcomes: 2 months after the start of implementation and 4 months after the end of implementation (uptake-adherence)
Waterkeyn & Cairncross, 2005 Study date: August 2000-March 2001	Quasi-experimental: non-RCT	Region/country: Sub-Saharan Africa, Zimbabwe Target level: individual Setting: rural Scale: large scale Sample size: 736 individuals	WASH component: sanitation Promotional approach: • Intervention: Community Health Clubs: voluntary organisations, open to everyone, free of charge, who seek to change norms and beliefs within a group as these are recognised as controlling behaviour. Long term strategy to enable people to control determinations of health, in 2 stages: Stage 1: health education provides entry point as a means of galvanising and forming a common unity within the target population. Stage 2 (second year): knowledge is applied to daily life through ensuring good hygiene, safe water supplies and improved sanitation.	Primary outcomes: latrine use†, safe faeces disposal (open faeces disposal, child faeces in yard)† Timing of measurement of primary outcomes: not reported (uptake)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
		(intervention) vs 172 individuals (control)	Training material for health promotion: 14 sets of illustrated cards based on observation at village level and pre-tested on illiterate villagers. A 'membership card' provided an outline of the syllabus. A course consisted of 20 sessions and took between 6 and 8 months of weekly attendance. In the weekly meetings of the Community Health Club members focused on one topic, debating common problems, prompted by the participatory Hygiene and Sanitation Transformation (PHAST) activities. All health clubs had executive committees, constitutions and annual elections. Application of knowledge gained was emphasised and 'homework' was agreed at every session with members pledging small home improvements and behaviour changes (cover for the drinking water, ladle to take water, construction of a garbage pit, pot/drying rack and handwashing facility) to be effected by the following week. Monitoring of progress was done by home visits between members. Each club produced health songs which were sung at every session and dramas depicting local health issues were developed for other clubs, visitors and for the schools. Health slogans punctuated each session, reinforcing key messages and providing resolve and focus to the group in a traditional manner. The provision of a reliable motorcycle was probably the most effective material incentive for the Environmental Health Technicians, although they were also given a nominal lunch allowance. • Comparison: no promotional approach Classification: community-based approach	
Whaley & Webster, 2011 Study date: 2010	Quasi-experimental: non-RCT (mixed methods study)	Region/country: Sub-Saharan Africa, Zimbabwe Target level: household Setting: no information Scale: large scale Sample size: 100 households	WASH component: WASH (general) Promotional approach: • Intervention: Community Health Clubs (CHC's). A 'horizontal' approach, seeing the problem of disease as a social and structural issue and addressing a raft of 20 health issues, from HIV/AIDS and malaria to pit latrines, handwashing and refuse pits. CHC's are open for anyone to join, operate over a period of six months where club members gather weekly at a meeting point to discuss and debate a particular health topic. The session is led by a trained facilitator, sometimes from the community, who incorporates the use of pictorial cards displaying images of good and bad health practices into the discussion. Information and ideas are	Primary outcomes: latrine use†, safe faeces disposal (open faeces disposal)† Timing of measurement of primary outcomes: not reported (uptake)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
		(intervention) vs 103 households (control)	often expressed through song, dance, poetry and drama. The 6 months culminates in a 'model home competition'. • Comparison: Community-Led Total Sanitation. A 'vertical' approach concerned solely with the achievement of open defecation-free communities and the crucial practice of handwashing with soap. A single day of 'triggering' and a number of post-triggering follow-up visits, where facilitators enter a community and, by using a selection of tried and tested techniques, elicit emotions such as shame, embarrassment and disgust from villagers as they realise that by practising open defecation they are in essence eating each other's faeces. This revelation is designed to bring about a transformation in the community who vow to come up with a plan to stop open defecation, which usually involves the construction of temporary toilets from locally available resources. Classification: community-based approach	
Yeager et al., 2002 Study date: October 1996-March 1997	Experimental: Quasi-RCT (mixed methods study)	Region/country: Latin America and Caribbean, Peru Target level: community Setting: urban Scale: large scale Sample size: 285 households (intervention) vs 293 households (control)	WASH component: sanitation Promotional approach: • Intervention: Introduce the topic of potty use to mothers with young children who attend the health centre and in the outreach activities that CRED (Growth and Development Program) staff were required to carry out. Three opportunities in which intervention messages could be delivered were CRED consultations, in the outreach activities of the CRED personnel and in the waiting rooms of the health centres. A 20 min video, with a focus on the key issues of potty use and clearance of stools from the home environment, was intended for use both in health talks in the community and in the waiting areas of the health centre. In the video, a toddler who gets diarrhoea through contact with faeces of the neighbour's toddler, gets treated at the health center where the problem and solution are explained. The neighbour switches to potty use and to using CRED facilities. These issues are contained in a soap opera story. A song was developed for the beginning and the end of the story. This song was taped and interspersed with other songs so it could be played in the health centre waiting rooms. A pamphlet presented, along with other key messages, the 4 steps to potty training ((1) recognizing gestures for wanting to defecate, (2)	Primary outcomes: handwashing at key times†, safe faeces disposal† Timing of measurement of primary outcomes: 0-5 months after the end of implementation (adherence)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
			teaching child to say ca-ca when s/he makes these gestures, (3) show child the potty when s/he asks to defecate, (4) teach child gradually to use potty, helping by keeping him/her company). Pamphlets were made available in CRED consulting rooms and distributed at community talks. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	
Younes et al., 2015 Study date: March 2010-November 2011	Quasi-experimental:non-RCT	Region/country: South Asia, Bangladesh Target level: community Setting: rural Scale: large scale Sample size: 926 individuals (intervention) vs 971 individuals (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention: Participatory Women's Groups met on a monthly basis discussing maternal and neonatal health issues. They proceeded through a participatory learning and action cycle focusing on health issues relating to children under 5 years of age. A paid female facilitator led the group. Her role was to activate and strengthen groups, support them in identifying and prioritising under-5 health problems (phase 1), help identify possible strategies (phase 2), support the planning, implementation (phase 3) and monitoring of the strategies led by the women's group members (phase 4). Under-5 health issues that were discussed in groups included breast feeding, undernutrition, vitamin 1 supplementation, immunisation, danger signs, common childhood illnesses and accidents and injuries. At the end of phase 2, community meetings were held to engage the wider community in the development and implementation of the strategies of the Women's Groups. Control and intervention clusters all received health services to strengthen initiatives throughout the project. These initiatives focused on technical support and training to frontline health workers, provision of weighing scales and sphygmomanometers to 44 community clinics, and facilitation of links between community clinic committees, union council health committees, upazilla health advisory committees and upazilla health and family planning coordination meetings. These initiatives were intended to strengthen supply-side capacity to respond to community health needs. • Comparison: no promotional approach Classification: community-based approach	Primary outcomes: handwashing at key times* Secondary outcomes: morbidity (diarrhoea, acute respiratory illness) Timing of measurement of primary outcomes: not reported (uptake)

Reference and study date	Study design	Population ¥	Intervention	Outcome*
Zhang et al., 2013 Study date: study dates not reported	Experimental: cluster RCT	Region/country: Sub-Saharan Africa, Uganda Target level: school Setting: rural Scale: small scale Sample size: 200 individuals, 4 schools (intervention) vs 200 individuals, 4 schools (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention: Element 1: Handwashing education. The education component is centered on instructional lessons about the benefits, proper technique and critical times when handwashing should take place. This includes poster presentations, a handwashing song, distribution of flyers and discussions with students about handwashing with soap. All educational materials were translated from English into Lusoga, the local language. Element 2: infrastructure promotion, construction of tippy-taps (i.e. handwashing station constructed from commonly available materials). Students constructed the tippy-taps (under adult supervision) and were assigned maintenance duties by teachers. • Comparison: Only the handwashing education element. Classification: sanitation and hygiene messaging	Primary outcomes: handwashing* Timing of measurement of primary outcomes: 1 month after the start of implementation (uptake)

¥ Scale: small scale: programme enrolled in one/several villages; large scale: programme enrolled on a sub-district, district, province, region or national level; Setting: rural/urban setting: as mentioned by the paper; informal-rural setting: all relatively dense, unplanned, informal settlements within the boundaries of towns or cities. It encompasses: slums (unplanned housing illegally constructed on land with no security of tenure, sometimes referred to as 'squatter settlements'); unplanned settlements where land tenure is formalised; growth areas on the edges of cities and towns where housing may be unplanned and growth rates high (often referred to as 'periurban' or the 'peri-urban interface') and all other densely settled areas which lie outside the formal planned definition of a city or town.
* Self-reported outcome
† Outcome measured through observation

Table 5: Assessment of the certainty of evidence for handwashing after toilet use (pooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing after toilet use (Huda 2012 and Phuanukoonnon 2013)												
2	2 randomised trials [a]	very serious [b]	not serious	not serious	not serious	none	324/382 (84.8%)	90/150 (60.0%)	**RR 1.06** (0.99 to 1.14)	**36 more per 1.000** (from 6 fewer to 84 more)	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT (Huda 2012) and 1 quasi-RCT (Phuanukoonnon 2013)
b. Selection bias (Huda 2012), attrition, detection and reporting bias (Phuanukoonnon 2013)

Table 6: Assessment of the certainty of evidence for handwashing before cooking (pooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing before cooking (Bowen 2013 and Stanton 1987)												
2	2 randomised trials [a]	serious [b]	not serious	not serious	serious [c]	none	256/333 (76.9%)	118/201 (58.7%)	**RR 1.23** (1.09 to 1.39)	**135 more per 1.000** (from 53 more to 229 more)	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 2 cluster RCTs
b. detection bias (Bowen 2013) and attrition bias (Stanton 1987)
c. low number of events

Table 7: Assessment of the certainty of evidence for handwashing before cooking (pooled data), elements of psychosocial theory vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Theory-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing before cooking (Langford 2013 and Luby 2010)												
2	2 randomised trials [a]	very serious [b]	not serious	not serious	serious [c]	none	85/356 (23.9%)	1/155 (0.6%)	**RR 33.06** (6.72 to 162.69)	**207 more per 1.000** (from 37 more to 1.000 more)	⨁◯◯◯ VERY LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT (Luby 2010) and 1 quasi-RCT (Langford 2013)
b. Detection bias (Langford 2013), attrition bias (Langford 2013 and Luby 2010), reporting bias (Langford 2013 and Luby 2010) and other bias (Langford 2013)
c. Low number of events

Table 8: Assessment of the certainty of evidence for handwashing before eating (pooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing before eating (Huda 2012 and Phuanukoonnon 2013)												
2	2 randomised trials [a]	very serious [b]	not serious	not serious	not serious	none	326/2209 (14.8%)	91/2045 (4.4%)	**RR 1.12** (1.02 to 1.22)	**5 more per 1.000** (from 1 more to 10 more)	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT (Huda 2012) and 1 quasi-RCT (Phuanukoonnon 2013)
b. Selection bias (Huda 2012), attrition, detection and reporting bias (Phuanukoonnon 2013)

Table 9: Assessment of the certainty of evidence for handwashing before eating (pooled data), elements of psychosocial theory vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Elements of psychosocial theory	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing before eating (Langford 2013 and Luby 2010)												
2	2 randomised trials [a]	serious [b]	not serious	not serious	serious [c]	none	92/472 (19.5%)	0/131 (0.0%)	**RR 34.73** (4.90 to 246.39)	**0 fewer per 1.000** (from 0 fewer to 0 fewer)	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT (Luby 2010) and 1 quasi-RCT (Langford 2013)
b. Attrition and reporting bias (Langford 2013 and Luby 2010) and detection and other bias (Langford 2013)
c. Low number of events

Table 10: Assessment of the certainty of evidence for handwashing before feeding a child (pooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing before feeding a child (Huda 2012 and Phuanukoonnon 2013)												
2	2 randomised trials [a]	very serious [b]	not serious	not serious	serious [c]	none	292/890 (32.8%)	80/653 (12.3%)	**RR 1.04** (0.94 to 1.15)	**5 more per 1.000** (from 7 fewer to 18 more)	⨁◯◯◯ VERY LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT (Huda 2012) and 1 quasi-RCT (Phuanukoonnon 2013)
b. Selection bias (Huda 2012), attrition, detection and reporting bias (Phuanukoonnon 2013)
c. Low number of events

Table 11: Assessment of the certainty of evidence for handwashing before feeding a child (pooled data), elements of psychosocial theory vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Elements of psychosocial theory	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing before feeding a child (Langford 2013 and Luby 2010)												
2	2 randomised trials [a]	serious [b]	not serious	not serious	serious [c]	none	34/64 (53.1%)	8/52 (15.4%)	**RR 3.63** (1.91 to 6.88)	**405 more per 1.000** (from 140 more to 905 more)	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT (Luby 2010) and 1 quasi-RCT (Langford 2013)
b. Attrition and reporting bias (Langford 2013 and Luby 2010) and detection and other bias (Langford 2013)
c. Low number of events

Table 12: Assessment of the certainty of evidence for latrine use (adherence) (pooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Latrine use: adherence (Jinadu 2007 and Pattanayak 2009)												
2	2 randomised trials [a]	serious [b]	not serious	not serious	serious [c]	none	47/174 (27.0%)	18/177 (10.2%)	**RR 2.63** (1.62 to 4.29)	**166 more per 1.000** (from 63 more to 335 more)	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 RCT (Jinadu 2007) and 1 cluster RCT (Pattanayak 2009)
b. Reporting bias (Jinadu 2007) and attrition bias (Pattanayak 2009)
c. Low number of events

Table 13: Assessment of the certainty of evidence for open defecation (pooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Open defecation (Lansdown 2002, Stanton 1987 and Wang 2013)												
3	3 randomised trials [a]	serious [b]	not serious	not serious	serious [c]	none	172/197 (87.3%)	168/191 (88.0%)	**RR 0.99** (0.72 to 1.37)	**9 fewer per 1.000** (from 246 fewer to 325 more)	⊕⊕◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 RCT (Lansdown 2002) and 2 cluster RCT's (Stanton 1987 and Wang 2013)
b. Detection bias (Lansdown 2002), attrition bias (Stanton 1987) and reporting bias (Lansdown 2002 and Wang 2013)
c. Low number of events

Table 14: Assessment of the certainty of evidence for skills, using soap for handwashing (pooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Skills: using soap for handwashing (Bowen 2013 and Luby 2009)												
2	2 randomised trials [a]	serious [b]	not serious	not serious	not serious	none	592/626 (94.6%)	291/326 (89.3%)	**RR 1.05** (1.02 to 1.08)	**45 more per 1.000** (from 18 more to 71 more)	⊕⊕⊕◯ MODERATE	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 2 cluster RCT's
b. Detection bias (Bowen 2013) and attrition bias (Luby 2009)

Table 17: Assessment of the certainty of evidence for handwashing at key times (uptake) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing at key times (uptake) (Younes 2015)												
1	1 Quasi-experimental study [a]	not serious	not serious	not serious	not serious	none	930/2164 (43.0%)	321/2376 (13.5%)	not pooled	not pooled	⊕⊕◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 non-randomised controlled trial

Table 18: Assessment of the certainty of evidence for handwashing at key times (adherence) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing at key times (adherence) (Jinadu 2007 and Phuanukoonnon 2013)												
2	2 randomised trials [a]	serious [b]	serious	not serious	not serious	none	1220/1982 (61.6%)	326/617 (52.8%)	not pooled	not pooled	⊕⊕◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 RCT (Jinadu 2007) and 1 quasi-RCT (Phuanukoonnon 2013)
b. Attrition bias (Phuanukoonnon 2013) and detection bias (Phuanukoonnon 2013)

Table 19: Assessment of the certainty of evidence for handwashing at key times (longer-term use) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing at key times (longer-term use) (Huda 2012, Kochurani 2009 and Pickering 2015)												
3	2 randomised trials [a] and 1 quasi-experimental study [b]	very serious [c]	not serious	not serious	serious [d]	none	Three studies measured longer-term use outcomes (Huda 2012, Pickering 2015, Kochurani 2009). The community-based intervention significantly improved handwashing with soap (MD 0.50, 95% CI [0.33, 0.67]) (Pickering 2015). Kochurani (2009), a school level study, found that the community-based intervention significantly increased the frequency of handwashing before eating (96% versus 61%, n=7,835; p<0.0001). However, a significant effect in handwashing at 7 different key times (including handwashing before eating) could not be demonstrated in an experimental study with serious risk of bias (Huda 2012).				⊕◯◯◯ VERY LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 2 cluster RCT's (Huda 2012 and Pickering 2015)
b. 1 non-randomised controlled trial (Kochurani 2009)
c. Selection bias (Huda 2012, Kochurani 2009 and Pickering 2015), attrition/reporting bias (Pickering 2015), bias due to confounding/bias in measurement of outcomes/interventions/bias due to departures from intended interventions (Kochurani 2009)
d. Lack of data

Table 20: Assessment of the certainty of evidence for latrine use (adherence) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Latrine use: adherence (Jinadu 2007 and Pattanayak 2009)												
2	2 randomised trials [a]	serious [b]	not serious	not serious	serious [c]	none	163/397 (41.1%)	32/391 (8.2%)	not pooled	not pooled	⊕⊕◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 RCT (Jinadu 2007) and 1 cluster RCT (Pattanayak 2009)
b. Reporting bias (Jinadu 2007) and attrition bias (Pattanayak 2009)
c. Low number of events

Table 21: Assessment of the certainty of evidence for latrine use (longer-term use) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Latrine use: longer-term use (Hoque 1994/1996 and Pickering 2015)												
2	2 randomised trials [a]	serious [b]	serious	not serious	not serious	none	1860/2367 (78.6%)	526/1817 (28.9%)	not pooled	not pooled	⊕⊕◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 RCT (Hoque 1994/1996) and 1 cluster-RCT (Pickering 2015)
b. Selection bias (Huda 2012/Pickering 2015) and attrition/reporting bias (Pickering 2015)

Table 22: Assessment of the certainty of evidence for safe faeces disposal (uptake) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Safe faeces disposal practices (uptake) (Patil 2013/2015 and Waterkeyn 2005)												
2	1 randomised trial [a] and 1 quasi-experimental study [b]	very serious [c]	not serious	not serious	serious [d]	none	Two studies measured outcomes during the study period ("uptake") (Waterkeyn & Cairncross, 2005; Patil et al., 2013/2015). A statistically significant increase of "not disposing faeces in the open" (RR 2.41, 95% CI [1.99, 2.90]) was demonstrated in a quasi-experimental study (Waterkeyn & Cairncross, 2005). No difference in the presence of child faeces in the yard was shown (Waterkeyn & Cairncross, 2005). Patil et al. (2013/2015) reported this outcome result as means, but no standard deviations were given. From the paper, the ITT adjusted difference between intervention and control was 0.075, 95% CI [0.036, 0.113] for child faeces disposal (in favour of the community-based intervention) and 0.019, 95% CI [-0.026, 0.065] for "no faeces observed in living area", the latter being non-significant.				⊕◯◯◯ VERY LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 cluster RCT (Patil 2013/2015)
b. 1 non-randomised controlled trial (Waterkeyn 2005)
c. Detection bias (Patil 2013/2015), selection bias/bias due to confounding/bias in measurement of interventions/outcomes/bias due to departures from intended interventions (Waterkeyn 2005)
d. Lack of data

Table 23: Assessment of the certainty of evidence for safe faeces disposal (adherence) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Safe faeces disposal practices (adherence) (Jinadu 2007)												
1	1 randomised trial [a]	serious [b]	not serious	not serious	not serious	none	226/300 (75.3%)	132/290 (45.5%)	not pooled	not pooled	⨁⨁⨁◯ MODERATE	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 RCT
b. Reporting bias

Table 24: Assessment of the certainty of evidence for safe faeces disposal (longer-term use) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Safe faeces disposal practices (longer-term use) (Huda 2012 and Pickering 2015)												
2	2 randomised trials [a]	serious [b]	not serious	not serious	serious [c]	none	76/652 (11.7%)	46/726 (6.3%)	not pooled	not pooled	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 2 cluster RCTs
b. Selection bias (Huda 2012 and Pickering 2015) and attrition/reporting bias (Pickering 2015)
c. Low number of events

Table 25: Assessment of the certainty of evidence for open defecation (uptake) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Open defecation (uptake) (Patil 2013/2015)												
1	1 randomised trial [a]	serious [b]	not serious	not serious	not serious	none	The study reported this outcome result as means, but no standard deviations were given. The ITT adjusted difference between intervention and control was -0.087, 95% CI [-0.135, -0.038] for men, -0.091, 95% CI [-0.141, -0.041] for women and -0.054, 95% CI [-0.088, -0.020] for children, thus the community-based intervention significantly reduced open defecation in men, women and children.				⊕⊕⊕◯ MODERATE	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 cluster RCT
b. Detection bias

Table 26: Assessment of the certainty of evidence for open defecation (adherence) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Open defecation (adherence) (Guiteras 2015b)												
1	1 randomised trial [a]	serious [b]	not serious	not serious	not serious	none	The study reported this outcome as a % mean difference. It was shown that a latrine promotion program (LPP) in combination with subsidies (and a supply intervention) resulted in a statistically significant decreased open defecation (MD -9%, 95% CI [-13.70, -4.30] for LPP+subsidy and MD -9%, 95%CI [-14.10, -3.90] for LPP+subsidy+supply. A statistically difference in open defecation after receiving the supply intervention only could not be demonstrated (MD -2.50%, 95%CI [-10.73, 5.73]				⊕⊕⊕◯ MODERATE	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 cluster RCT
b. Other bias

Table 27: Assessment of the certainty of evidence for open defecation (longer-term use) (unpooled data), community-based approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Community-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Open defecation (longer-term use) (Guiteras 2015b, Kochurani 2009 and Pickering 2015)												
3	2 randomised trials [a] and 1 quasi-experimental study [b]	very serious [c]	not serious	not serious	serious [d]	none	A statistically significant decrease in open defecation on the longer term was shown in adult women, adult men, and children younger and older than 5 years in one study (Pickering et al., 2015). Kochurani et al. (2009) found that the community-based intervention in schools significantly reduced the number of girls practicing open defecation (1% versus 9%, n=7,835; p=0.004), however for boys no significant difference was found (30% versus 23%; p=0.12). Finally, in 1 study (Guiteras 2015b), a statistically difference in open defecation after receiving a latrine promotion program could not be demonstrated (MD -2.10%, 95%CI [-7.20, 3.00]				⊕◯◯◯ VERY LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 2 cluster RCT's (Guiteras 2015b and Pickering 2015)
b. 1 non-randomised controlled trial (Kochurani 2009)
c. Selection bias (Kochurani 2009 and Pickering 2015), attrition/reporting bias (Pickering 2015), bias due to confounding/bias in measurement of outcomes/interventions/bias due to departures from intended interventions (Kochurani 2009) and other bias (Guiteras 2015b)
d. Lack of data

Table 28: Assessment of the certainty of evidence for handwashing at key times (adherence) (unpooled data), social marketing approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Marketing approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing at key times (adherence) (Arnold 2009, Briceno 2015 and Galiani 2012/2015)												
3	2 randomised trials [a] and 1 observational study [b]	very serious [c]	serious	not serious	not serious	none	Two experimental studies (Galiani et al., 2012/2015; Briceno et al., 2015), and one observational study (Arnold et al., 2009) measured outcomes less than 12 months after the programme period ("adherence"), and some differences across these studies were found. In a study with moderate risk of bias (Briceno et al., 2015), for the outcome "handwashing before food handling" a significant effect was shown when implementing a handwashing intervention (MD 7.70, 95% CI [3.78, 11.62]), or a combined handwashing and sanitation intervention (MD 1.60, 95% CI [0.03, 3.17)], however results were not consistent when measured by observation or in a self-reported way (Briceno et al., 2015). In addition, this effect could not be shown in a second study with moderate risk of bias, implementing a community level, or school level intervention (Galiani et al., 2012/2015). For "handwashing with water and soap prior to eating" a significant effect was shown in the case of a school level intervention (self-reported: MD 0.095, 95% CI [0.01, 0.18]; observation: MD 0.12, 95% CI [0.02, 0.21]) (Galiani et al., 2012/2015), but not for the community level intervention (Galiani et al., 2012/2015) or in the observational study (Arnold et al., 2009). Finally, no significant effect could be demonstrated for handwashing with soap during the period "the last 24 hours" (Briceno et al., 2015), or handwashing at other key times (before feeding a child, after faecal contact, before cooking, before eating, after changing baby) (Arnold et al., 2009; Briceno et al., 2015; Galiani et al., 2012/2015).			⨁◯◯◯ VERY LOW	CRITICAL

CI: Confidence interval; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).

a. 2 cluster RCTs (Briceno 2015 and Galiani 2012/2015)

b. 1 cohort study (Arnold 2009)

c. Attrition/other bias (Briceno 2015), bias in measurement of outcomes/bias due to departures from intended interventions (Arnold 2009)

Table 29: Assessment of the certainty of evidence for latrine use (adherence) (unpooled data), social marketing approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Marketing approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Latrine use (adherence) (Briceno 2015)												
1	1 randomised trial [a]	serious [b]	not serious	not serious	not serious	none	A significant effect on shared latrine use could not be demonstrated in the case of a handwashing intervention only (MD -3.1, 95% CI [-8.98, 2.78]), however in the case of a sanitation intervention, or a combined handwashing and sanitation intervention, a significant decrease of shared latrine use (indicating more private latrine use) was shown (MD -9.2, 95% CI [-14.49, -3.91] and MD -7.6, 95% CI [-70.90, -81.10] respectively) (Briceno et al., 2015).				⨁⨁⨁◯ MODERATE	CRITICAL

CI: Confidence interval; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT
b. Attrition/other bias

Table 30: Assessment of the certainty of evidence for safe faeces disposal (adherence) (unpooled data), social marketing approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Marketing approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Safe faeces disposal practices (adherence) (Arnold 2009 and Briceno 2015)												
2	1 randomised trial [a] and 1 observational study [b]	very serious [c]	serious	not serious	not serious	none	In an experimental study with moderate risk of bias, a positive effect was seen for the observation of faeces outside the latrine in the case of a combined handwashing and sanitation intervention (MD -4.3, 95% CI [-8.42, -0.18]), and on safe child faeces disposal in the case of a sanitation or combined intervention (MD 11.7, 95% CI [5.04, 18.36] and MD 8.4, 95% CI [1.93, 14.87] respectively)), but not for the handwashing intervention alone (MD 4.3, 95% CI [-2.76, 11,36]) (Briceno 2015). No significant increase in safe faeces disposal could be demonstrated in an observational study with serious risk of bias (RR 0.91, 95% CI [0.83, 1.01]) (Arnold 2009).				⨁◯◯◯ VERY LOW	CRITICAL

CI: Confidence interval; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCTs (Briceno 2015)
b. 1 cohort study (Arnold 2009)
c. Attrition/other bias (Briceno 2015), bias in measurement of outcomes/bias due to departures from intended interventions (Arnold 2009)

Table 31: Assessment of the certainty of evidence for open defecation (adherence) (unpooled data), social marketing approach vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Marketing approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Open defecation (adherence) (Briceno 2015)												
1	1 randomised trial [a]	serious [b]	not serious	not serious	not serious	none	In case of a sanitation, or combined sanitation and handwashing intervention, a statistically significant decrease of people that always or regularly practice open defecation, and that usually defecate in fields, bushes or rivers, could be shown for the period less than 12 months after the end of the implementation ("adherence"), but not for the handwashing intervention alone (Briceno et al., 2015).				⨁⨁⨁◯ MODERATE	CRITICAL

CI: Confidence interval; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT
b. Attrition/other bias

Table 32: Assessment of the certainty of evidence for handwashing at key times (uptake) (unpooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing at key times (uptake) (Pickering 2013)												
1	1 randomised trial [a]	serious [b]	not serious	not serious	not serious	none	2089/3692 (56.6%)	686/3482 (19.7%)	not pooled	not pooled	⨁⨁⨁◯ MODERATE	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT
b. Reporting, detection and other bias

Table 33: Assessment of the certainty of evidence for handwashing at key times (adherence) (unpooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing at key times (adherence) (Abiola 2012, Stanton 1987, Yeager 2002)												
3	3 randomised trials [a]	very serious [b]	not serious	not serious	not serious	none	313/631 (49.6%)	290/598 (48.5%)	not pooled	not pooled	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 2 quasi-RCTs (Abiola 2012 and Yeager 2002) and 1 cluster RCT (Stanton 1987)
b. Reporting bias (Abiola 2012 and Yeager 2002), attrition bias (Stanton 1987 and Yeager 2002) and detection bias (Abiola 2012)

Table 34: Assessment of the certainty of evidence for handwashing at key times (longer-term use) (unpooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing at key times (longer-term use) (Bowen 2013 and Luby 2009)												
2	2 randomised trials [a]	serious [b]	serious	not serious	not serious	none	No significant difference in handwashing with or without soap was shown in the first study (RR 1.02, 95% CI [0.99, 1.05) (Luby et al., 2009). However, in the second study the education approach had a positive effect on 8 out of 14 “handwashing at key times” outcomes (Bowen et al., 2013).				⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 2 cluster RCTs
b. Detection bias (Bowen 2013 and Luby 2009) and attrition bias (Luby 2009)

Table 35: Assessment of the certainty of evidence for latrine use (adherence) (unpooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Latrine use (adherence) (Caruso 2014)												
1	1 randomised trial [a]	serious [b]	serious	not serious	serious [c]	none	The school-based handwashing educational approach in this study resulted in statistically significantly increased latrine use (MD 1.80, 95% CI [0.81, 2.79]), however, surprisingly, when the same intervention was combined with a latrine cleaning element, a significant decrease in latrine use was measured (MD -1.00, 95% CI [-1.97, -0.03]) (Caruso et al., 2014).				⊕◯◯◯ VERY LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 quasi-RCT
b. Attrition/reporting bias
c. Large variability in results

Table 36: Assessment of the certainty of evidence for safe faeces disposal (adherence) (unpooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Safe faeces disposal practices (adherence) (Yeager 2002)												
1	1 randomised trial [a]	serious [b]	not serious	not serious	serious [c]	none	103/323 (31.9%)	72/323 (22.3%)	not pooled	not pooled	⊕⊕◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⊕◯◯◯), low quality (⊕⊕◯◯), moderate quality (⊕⊕⊕◯) to high quality (⊕⊕⊕⊕).
a. 1 quasi-RCT
b. Reporting/attrition bias
c. Low number of events

Table 37: Assessment of the certainty of evidence for open defecation (uptake) (unpooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Open defecation practices (uptake) (Lansdown 2002 and Wang 2013)												
2	2 randomised trials [a]	serious [b]	not serious	not serious	serious [c]	none	56/71 (78.9%)	101/115 (87.8%)	not pooled	not pooled	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 RCT (Lansdown 2002) and 1 cluster RCT (Wang 2013)
b. Reporting and detection bias (Lansdown 2002 and Wang 2013)
c. Low number of events

Table 38: Assessment of the certainty of evidence for open defecation (adherence) (unpooled data), sanitation and hygiene messaging vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Sanitation and hygiene messaging	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Open defecation practices (adherence) (Stanton 1987 and Wang 2013)												
2	2 randomised trials [a]	serious [b]	not serious	not serious	serious [c]	none	116/125 (92.8%)	67/76 (88.2%)	not pooled	not pooled	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 2 cluster RCTs
b. Attrition bias (Stanton 1987) and reporting/detection bias (Wang 2013)
c. Low number of events

Table 39: Assessment of the certainty of evidence for handwashing at key times (uptake) (unpooled data), elements of psychosocial theory vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Theory-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing at key times (uptake) (Langford 2013 and Luby 2010)												
2	2 randomised trials [a]	very serious [b]	not serious	not serious	not serious	none	743/3422 (21.7%)	144/2884 (5.0%)	not pooled	not pooled	⨁⨁◯◯ LOW	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 quasi-RCT (Langford 2013) and 1 cluster RCT (Luby 2010)
b. Attrition/reporting bias (Langford 2013 and Luby 2010) and detection and other bias (Langford 2013)

Table 40: Assessment of the certainty of evidence for handwashing at key times (adherence) (unpooled data), elements of psychosocial theory vs no promotional approach

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Theory-based approach	no promotional approach	Relative (95% CI)	Absolute (95% CI)		
Handwashing at key times (adherence) (Biran 2009)												
1	1 randomised trials [a]	serious [b]	not serious	not serious	not serious	none	Handwashing at key times was significantly improved, both at 6 weeks (MD 15.00, 95% CI [10.71, 19.29]) and 6 months (MD 31.00, 95% CI [29.45, 32.55]).				⨁⨁⨁◯ MODERATE	CRITICAL

CI: Confidence interval; **RR:** Risk ratio; quality of the evidence ranges from very low quality (⨁◯◯◯), low quality (⨁⨁◯◯), moderate quality (⨁⨁⨁◯) to high quality (⨁⨁⨁⨁).
a. 1 cluster RCT
b. Reporting bias

Table 43: Characteristics of the included qualitative studies

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
Adeyeye, 2011 Study date: unclear	Qualitative study	Region/country: Sub-Saharan Africa, Nigeria Target level: community Setting: rural Number of participants interviewed: 20 households	WASH component: sanitation Promotional approach: Community-led Total Sanitation (CLTS) approach: trained facilitators enter a community to "trigger" the community. Facilitators (local government or NGO staff in Ekiti State) employ participatory rural appraisal (PRA) methods to determine status of sanitation coverage in the community, including going on transect walks with community members, observing and drawing sanitation maps of all areas in which open defecation occurs, and calculating the amount of faeces deposited on the land in a year. The goal is to evoke a sense of "disgust and shame" in the community. The community should infer from the data generated that current sanitation practices (open defecation and infrequent handwashing) can lead to illness and death, which should then inspire community members to take action to reach open defecation-free status. The impetus for behavioural change in the community should not come from the facilitators forcing the community to adopt CLTS. Communities then devise action plans to reach open defecation-free status without household	This report examines the role "gender mainstreaming" plays in the progress of Ekiti State CLTS projects.	Data were collected through semi-structured interviews and observations in the three villages, as well as through a questionnaire administered to households in Osogbotedo.	No information

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			level subsidies (i.e. using local materials to construct latrines). Access to water is a necessary prerequisite to adequate sanitation. With sanitation but without access to water, communities struggle to create and use handwashing stations, which are necessary to reduce the incidence of faecal-oral disease transmission. CLTS prioritizes community-based leadership through its reliance on WASCOMs (members are elected to help community develop a sanitation action plan) and VHPs (volunteer to provide support as households implement changes in sanitation and hygiene practices). Classification: community-based approach			
Akter & Ali, 2014 Study date: April – May 2010	Qualitative study	Region/country: South Asia, Bangladesh Target level: other (Sub-district (Upazila)) Setting: rural Number of participants interviewed: 144 women from 56	WASH component: WASH (general) Promotional approach: Village WASH committees (VWCs) are formed based on participatory community process to facilitate intervention activities (intervention is being offered in communities, religious groups and educational institutions). To stimulate bottom-up participation, one VWC consisting of 11 members (6 women, 5 men) from different segments of the community is formed for an average of 200 households. Each VWC	In order to examine the factors that contributed to this improvement, the authors explored factors that facilitate and/or impede hygiene knowledge and practice.	Data were collected using in-depth interviews. Immediately after the interview, a summary of collected field notes was made and transcribed to get a sense of respondents' knowledge and perceptions about hygiene practices. The principal author (TA) routinely visited the field sites to supervise data	All narrative data were collected under three pre-determined broad categories: safe water use, sanitation and handwashing. Data were translated from Bangla to English and checked for completeness. Responses were manually sorted into subthemes such as hygiene indicators,

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
		upazilas across Bangladesh	assesses local needs through participatory exercises and social mapping and then develops a village WASH plan to improve the overall hygiene situation. Some of the major VWC activities: installation of tube wells and sanitary latrines. VWCs also help in creating awareness in order to change people's behaviour through activities such as health forums, folk songs, street plays, film and video shows. Sites are selected for community water sources, money collecting and monitoring of usage and maintenance of household latrines. Bangladesh Rural Advancement Committee (BRAC) programme organizers and assistants provide continuous support to the VWCs by visiting each VWC, overseeing their meetings and organizing their own meetings to encourage behavioural change among the community. Home visits are frequently made to motivate households to improve their hygiene behaviour and demonstrations of handwashing are given to members of the household. Classification: community-based approach		collection and ensure a high quality of work.	perception of practices, and health-related issues. Moreover, proposed courses of action were identified from the respondents' responses with the assumption that they themselves could best describe their own problems and needs. The implicit meanings of the narrative responses were analysed to identify and understand factors influencing hygiene knowledge and practice. Facilitating and impeding factors were identified and described under some broad categories that emerged from the in-depth interviews. Qualitative responses were quantified as frequencies in possible cases.
Andrade, 2013	Qualitative study	Region/country: Latin America and	WASH component: HWASH (general)	What is the role of health promoters as	Three one-hour focus groups, one in each health	Data from community member focus groups

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
Study date: 2008-2010	(mixed methods study)	Caribbean, El Salvador Target level: household, community Setting: rural Number of participants interviewed: 1163 individuals (intervention) vs 296 individuals (control) 30 community members in each focus group.	Promotional approach: • Intervention: The intervention was implemented at the individual/household level, school level and community level. Individual/household level: hygiene promotion and education to each household at least twice a month (but varied on household need); visits of 10 to 30 minutes, depending on goal of visit; provision of support for modifying home as necessary to enable hygienic behaviours; in-home skill-building, participatory demonstrations for handwashing, cooking, childcare, latrine maintenance and grey water disposal. All activities in the home were on an individual or group basis if family members were present. Education and assistance of families in learning the signs and symptoms of diarrheal disease and parasitism, mechanism for fluid replacement through oral rehydration salts, provision of referrals to clinic when necessary. School/community level: health promoters worked in 3 schools (grades 1-9) at least once a week with students doing various activities around topics like personal and household hygiene, dental hygiene and proper latrine habits. Time spent in schools ranges from 1-3 hours, depending on the	diffusion of innovation (DOI) change agents in the hygiene behaviour adoption process in a rural Latin American community context?	promoter service territory. A moderator's guide was used that was created in English and translated into Spanish. In the focus groups, with the use of a moderator guide, dynamics within households with regards to decision-making around hygiene were explored, as well as the perceived attributes of the recommended hygiene practices and the process of hygiene behaviour adoption. A free-listing with participants was conducted to identify ideal or positive attributes about the health promoters. Then, participants were asked to rank the attributes in terms of importance in general and with regards to how these attributes influenced their reception of programme messages. An interview guide that was created in English and translated into Spanish was used. The interview protocols included questions related to the role of the health promoter, how	and individual interviews consisted of moderator notes, secondary notes from a note-taker, free lists, and audiotapes, which were transcribed and analysed in Spanish. Analysis was conducted using the QSR NVIVO 2.0 software. The narrative data for thematic commonalities/clusters, were analysed and coded according to the constructs shown in the conceptual framework and the research questions. Consistent with a grounded theory approach, analysis also reflects information that arose, but did not directly correspond to the pre-determined areas of inquiry. In addition to thematic analyses, exact responses were pulled from the narrative data to better illustrate emerging themes. The data gleaned from the focus groups and individual

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			activity. Giving classes to children (fun, participatory activities like games, poster contests, role-plays); giving presentations to parents at school-wide parent meetings; work with school directors to modify schools to enable good hygiene (latrine upgrades, modifying handwashing stations and water storage, evaluating kitchen practices of parents who cook school lunches. Community level: community-wide campaigns, e.g. trash clean-up brigades, deliver messages at community events such as religious services, soccer tournaments and community meetings. • Comparison: no promotional approach Classification: community-based approach		they are perceived in the community, how the hygiene behaviours are perceived (including benefits/ drawbacks), and the characteristics of an effective health promoter. The numbers of focus groups (3) and interviews (6) were chosen based on the size of the community, the relative racial and cultural homogeneity of the population, and the number of health promoters and programme territories.	interviews were compared and contrasted to examine similarities and differences in perspective. Salient ranked free-lists of individual health promoter attributes that were elicited from the focus groups were compiled. A consensus was reached of the top attributes based on rankings across all focus groups. The qualities that were identified across groups and their rankings were compared to the hypothesized DOI change agent qualities hypothesized to be associated with adoption of innovations, including effort, orientation, compatibility, empathy, credibility, and homophily to community members.
Brooks et al., 2015 Study date: May – July 2014	Qualitative study	Region/country: Latin America and Caribbean, Haiti Target level: community	WASH component: WASH (general) Promotional approach: Members meet with a trained facilitator for one hour every week for 6 months. The 20+ session curriculum targets the	What is the role of health promoters as DOI change agents in the hygiene behaviour adoption process in a rural	Semi-structured interviews were conducted. Interviews were conducted in English and French, with	All interviews were recorded then transcribed in English, while comparing with the Kreyol recordings to ensure accurate

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
		Setting: rural Number of participants interviewed: 16 available CHC facilitators in Port-au-Prince and 3 neighbourhoods (52 graduates and 146 non-members)	entire range of WASH issues and behaviours, including personal hygiene, hand hygiene, drinking water and defecation practices, kitchen hygiene and environmental management for vector control. Sessions are conducted using a set of cards from the Community Health Club (CHC) toolkit (presenting a menu of cultural and context-specific options from which the members can choose), an expanded set of traditional Participatory Hygiene and Sanitation Transformation (PHAST) drawings and a range of participatory activities designed to generate debate, uncover attitudes towards behaviours and stimulate praxis. Once consensus is achieved, the new practice is assigned as homework to be completed by the next meeting. Group identity formation enables members to apply positive peer pressure and provide social support to motivate behaviour change. This supportive peer group creates the space for normative changes to occur by enabling people to see themselves differently and creating a 'common-unity' of understanding and purpose. Group identity is created and reinforced by an aspirational club name, slogan and song. Membership cards are used as a concrete representation of affiliation to	Latin American community context? This evaluation used interviews with CHC facilitators and household surveys in three case neighbourhoods to assess how the CHC model was implemented and if differences exist between CHC graduates and non-members.	simultaneous translation into Kreyol.	translation. Two team members created the codebook and one member coded the transcripts using MAXQDA. All coded segments were independently reviewed by three research team members.

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			the larger peer group and for self-monitoring. Club identity and structure provides the foundation for sustaining WASH behavioural changes and ensuring community engagement beyond WASH. Classification: community-based approach			
Bruck & Dinku, 2008 Study date: November – December 2008	Qualitative study	Region/country: Sub-Saharan Africa, Ethiopia Target level: community Setting: rural, urban Number of participants interviewed: unclear	WASH component: WASH (general) Promotional approach: Fieldwork was conducted in Amhara, Oromia and Southern Nations, Nationalities and Peoples Regional State (SNNPRS). 3 projects in 3 woredas of Amhara were visited. In each of the other regions one project was covered, and in Oromia an additional solar-wind hybrid water supply system was visited for special interest of innovative technology. All three projects in Amhara are new projects consisting of spring development and hand dug well construction in addition to hygiene education, private pit latrine and institutional latrines promotion activities. The project in SNNPRS is a rehabilitation project involving borehole rehabilitation and distribution network expansion and Water, Sanitation and Hygiene Committee) WASHCO strengthening interventions in addition to	The immediate objective of the evaluation is to assess: a.) achievements of the stated MWA programme objectives; b.) quality and standard of the service as compared with USAID and GOE guidelines; c.) impact of the project; d.) efficiency of resource utilization: and, e.) programme sustainability. The evaluation is to document the outputs/outcomes, lessons learned, challenges encountered, and the result of the	Data were collected through review of key programme related documents, interviews with key informants and beneficiaries, and observations of programme activities in the field. Team members also reviewed and assessed the quantitative data available on programme performance from the FY 2004 - 2008 periodic reports of the MWA which contained information on programme implementation process and accomplishments. The evaluation was conducted by a team of two professional and independent external consultants over a period of approximately four weeks.	No information

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			hygiene and sanitation promotion (including private and eco-san4 latrines). The project serves both rural and peri-urban villages. In Oromia, the visited project is a town/peri-urban WASH project involving a borehole with motorized water system as well as communal latrine facilities construction. The other project visited was a borehole based solar and wind hybrid model project in west Shoa. The projects in SNNRPS and Oromia are completed, while implementation of the others is still underway. Participation of communities in project implementation is observed to be very high in all projects visited. Communities have contributed in construction activities through provision of in-kind (labour and material) contributions and in Dendi, cash. Community participation should encompass other areas such as planning and monitoring, however, this is expected to develop a sense of post-implementation ownership and management responsibility. In all sites visited, WASHCOs (composed of 5-7 members, including 2-3 women) have been formed and trained under the project and have taken over responsibility for the future management of Operation & Management facilities.	programme's contributions to Ethiopia's Water Sector Development Program (WSDP) and benefiting communities.	MWA assigned the programme coordinator to join the team to facilitate the evaluation process. The assessment was participatory and mainly relied on qualitative information gathered from partners and other stakeholders through discussions and interviews at the various levels. To the extent possible information collected through these means was substantiated and complemented with assessment of secondary data obtained from various sources, including USAID/E, MWP project offices and government institutions. Methodology of data collection included: key informant interviews, focus group discussion, and field observations.	

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			Classification: community-based approach			
Cole et al., 2015 Study date: June – October 2012	Qualitative study	Region/country: Sub-Saharan Africa, Malawi Target level: no information Setting: urban Number of participants interviewed: 14 customers (6 women and 8 men) who were selected to receive micro-finance loans to purchase the ecological toilet.	WASH component: sanitation Promotional approach: Ecological sanitation facility (Skyloo) is a urine diverting dehydrating toilet. It is constructed above ground and has two vaults, which are identified as storage and in-use. The in-use vault collects human excreta for 6-12 months, whilst the storage vault remains closed. The in-use vault is closed after 6-12 months use to alternate with the storage vault. Within the storage vault, the human excreta dries to form a compost. Skyloo allows for source separation of the urine and faeces. Urine can be used as a source of nutrients to promote agricultural crop growth, while faeces, when adequately composted, can be utilised as a source of wetting agent that can act as a soil conditioner. Every 6-12 months, depending on the level of use, the compost from the storage vault is emptied. The Sanitation in Peri-Urban Areas (SPA) programme used a competitive tender process to recruit one business to act as the local sanitation business (LSB). The LSB was responsible for marketing, sales and construction of Skyloos. A national financial institution	Within social marketing and sanitation-related literature, there has been limited examination of the utility of Rogers' (2003) theory of diffusion to evaluate the uptake of innovative sanitation technologies in urban settings. This study addresses this gap through critically assessing the utility of specific components of Rogers' (2003) diffusion theory as theoretical frameworks for the adoption of ecological sanitation facilities in an urban setting in Malawi. The study examined the three elements of Rogers' (2003) diffusion theory by interviewing	The descriptive study applied open ended, in-depth interviews. The lead researcher conducted line-by-line analysis of the interview transcriptions after each interview. At the completion of the 14th interview, it was identified that no new information was derived. In keeping with qualitative research methodologies, it was decided to cease the interviews as saturation had been reached.	The characteristics of innovators (Research Question 1) were analysed by integrating the findings from the sanitation micro-loan application process and through deductive content analysis of the in-depth interviews. The content analysis was conducted line-by-line to identify significant meaning to a relevant sentence or groups of sentences. Each significant meaning was then categorised into groups. The groups were then formed into clusters derived from Rogers' (2003) diffusion theory. The role of interpersonal information sources (Research Question 2) was analysed using inductive content analysis. Deductive content analysis was used to examine Rogers' (2003) five attributes of

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			(commercial bank with limited experience in providing micro-finance and not previously engaged in a sanitation-related programme) provided the administrative services for the sanitation micro-finance. Monthly repayments were based on an interest rate of 30% urine per annum. Repayment period was 12 months. Selection of applicants for the sanitation microloans was managed by a local business consultancy. Load applicants were asked about their employment status, wage, home ownership, rental properties, business ownership and business income. Applicants could request a loan amount that covered both the costs of constructing the Skyloo and also provided surplus capital, which was provided for households to invest in an income-generating activity. Material and labour costs for the Skyloo ranged from USD 164-207, total load available ranged from USD 260-400. Classification: social marketing approach	householders that had purchased an ecological sanitation facility during the early stage of a social marketing programme. These householders are referred to as 'first movers'.		an innovation as perceived by customers of the Skyloo (Research Question 3). The matrix of analysis was developed based on the description of each of the five attributes presented in Rogers (2003). The meaning unit was a sentence or group of sentences. Relevant meaning units were categorised into groups. Groups were then clustered into Rogers' (2003) five attributes of an innovation that increases the rate of diffusion using QSR NVivo© v.10.
Emerging Markets Consulting, 2014 Study date: March 2014	Qualitative study	Region/country: South-East Asia and Oceania, Cambodia Target level: household Setting: rural	WASH component: WASH (general) Promotional approach: Non-hardware-subsidized approaches such as community-led total sanitation (CLTS); school and community water and sanitation hygiene (WASH);	The overall objectives of this study are to evaluate how MFIs support access to sanitation, assess different MFI sanitation models,	Two types of survey tools were used to assess each sanitation-financing model. These included interview guides with MFI loan officers and latrine sales agents, which were crucial	No information

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
		Number of participants interviewed: 8 focus group discussions (FGDs) and 20 in depth interviews (IDI) in 8 villages within 4 provinces	sanitation marketing; information, education and communication; and behavioural change communication campaigns. Sub-grantees such as WaterSHED and iDE not only educate people through marketing but also make sanitation-related financing available to rural households through microfinance institutions (MFIs). Under its CLTS activities, HFH attendees can register with a sanitation action group to obtain a loan. VisionFund's loan officer then contacts the household directly and completes the loan application and process. The loan is later disbursed to the latrine seller based on the total cost incurred. Households receive a rebate from HFH of USD 5 (if the loan is between USD 50 and USD 70) or USD 10 (if the loan is between USD 70 and USD 350) after they have successfully repaid their loan to the MFI. HFH leaves most of the financing activities to VisionFund and focusses on its own sanitation marketing activities. A seasonal repayment method is offered by VisionFund to their clients, which allows them to pay at the time they harvest their crops. Classification: social marketing approach	and recommend best practices for scaling up MFI sanitation financing. Specifically, two prominent models were examined; Sanitation Financing (SanFin) implemented by PATH/iDE and WASH Loans implemented by WaterSHED. The overarching goals of this study are to evaluate how MFIs support access to sanitation, to assess different MFI sanitation models, and to recommend best practices for scaling up MFI sanitation financing.	to assessing the programme's effectiveness in increasing sanitation as well as any challenges and recommendations that arose during operations. The demand side of the MFI models was assessed through focus group discussions (FGDs) with latrine user MFI loan clients and latrine user clients using other payment sources.	

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
Graves et al., 2013 Study date: July – August 2008	Qualitative study	Region/country: Sub-Saharan Africa, Kenya Target level: school Setting: rural Number of participants interviewed: 41 teachers (26 female and 15 male) at 16 schools	WASH component: hygiene (handwashing), water supply Promotional approach: NICHE project (conducted by Safe Water and AIDS Project (SWAP), Kenya Medical Research Institute (KEMRI), Centres for Disease Control and Prevention (CDC) and Ministries of Health and Education in rural western Kenya) focused on integrated approaches to household-based interventions to promote community health. One component of the project involves community use of the Safe Water System (SWS), a three-pronged intervention of point-of-use water treatment, safe water storage and behaviour change techniques for safe drinking water, handwashing and sanitation. Through NICHE, the SWS intervention was implemented in 51 primary schools in 2 stages in Nyando District, western Kenya. From each school, 2 teachers were trained in the handwashing programme, which included use of the SWS and handwashing clubs in their schools. All schools were provided with containers for safe water storage, soap for handwashing, water treatment supplies and low-cost, locally available	This qualitative study described teacher perspectives associated with implementing and sustaining a handwashing programme in primary schools participating in the Nyando Integrated Child Health and Education (NICHE) project. This qualitative study sought to gain teacher perspectives on barriers and facilitators associated with implementing and sustaining a handwashing programme in primary schools participating in the Nyando Integrated Child Health and Education (NICHE) project, a community-based programme of multiple, bundled	Structured interviews were carried out. Interview scripts were designed based on the goals of the handwashing component of SWS and reviewed for clarity and completeness by NICHE staff. The interviewer asked each respondent a standard series of open-ended questions. Interviews were conducted in English, digitally recorded, and transcribed verbatim without alteration or deletion of statements. Respondent names or identification were not recorded. Each interview lasted for 15 to 30 minutes.	The structured nature of the interview questions allowed for the identification of several a priori variables of interest, upon which an initial codebook was developed. To refine the codebook, two authors (JMG, EDF) coded a random sample of 10 transcripts together. Emerging themes beyond the pre-specified variables were identified and recorded using an open-coding approach. Coding from each evaluator was compared and discrepancies were discussed. New codes were iteratively developed and defined and added to the codebook when deemed appropriate by both coders. The authors independently coded the remaining transcripts and discrepancies were discussed as necessary. Codes and assigned text were entered into

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			materials to set up handwashing water stations. Furthermore, education manuals on handwashing were provided. All materials were provided and replaced for 1 year, after which schools were expected to continue the project independently if desired. Schools were monitored by locally trained NICHE staff members throughout the year. Classification: sanitation and hygiene messaging	child health interventions in Nyanza Province, western Kenya, with an evaluation component that involved data collection from 2007 to 2010.		Microsoft Excel. Variables directly based upon the interview questions were classified as categorical or binary variables. Text derived from the open-coding approach was grouped into major themes and topic areas in order to facilitate reporting.
Hueso & Bell, 2013 Study date: 2011	Qualitative study	Region/country: South Asia, India Target level: village Setting: rural Number of participants interviewed: National level: 37 semi-structured interviews with key informants; in four states: >100 interviews with sanitation key informants; village level: visits to >60 GPs.	WASH component: sanitation Promotional approach: The Total Sanitation Campaign sought to be community-led, people-centred, demand-driven and incentive-based (an incentive to the poorest of the poor household is given, instead of subsidy for individual household latrine units). Total sanitation (entire community becoming open defecation free (ODF)) was reinforced with the introduction of the Nirmal Gram Puraskar (NGP), which is a clean village award scheme in which high-level authorities distributed cash to Gram Panchayats (GPs = local communities) for achieving total sanitation. Classification: community-based approach	This article primarily aims to explore the dichotomy of TSC policy on paper and its implementation on the ground. We want to test our hypothesis that TSC implementation often did not follow its stated principles, negatively affecting the outcomes. We seek to identify elements and processes that help understand the theory–practice gap and briefly examine whether the changes introduced in the	Interviews, transect walks, focus group discussions, and observation were utilized. The number of interviews conducted was determined by the saturation factor, that is, based on when new interviews did not shed further light on the topics analysed, always being aware of potential biases or actors excluded. Primary research tools in the case studies included semi-structured interviews, focus group discussions, household surveys, observation and village immersion.	The analysis of the information gathered was through codification, according to the location and topic. This allowed combining data by themes and/or areas in order to make further comparison and analysis.

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				new NBA take into account previous lessons.		
Hulland et al., 2013 Study date: unclear	Qualitative study	Region/country: South Asia, Bangladesh Target level: compound Setting: rural Number of participants interviewed: 50 households in the urban site, 29 households in the rural site	WASH component: hygiene (handwashing) Promotional approach: 7 handwashing station design were tested in 2 phases. Phase 1 designs: • 30 litre drum with tap and soap container. • 2.25 litre Bodna (pot with spout traditionally used for anal cleansing after toileting) with soap cup • 2 litre Bottle (water only) with a valve cap and soap container • 1.5 litre Soapy water bottle with a hole in the cap for dispensing (placed at the water source) Phase 2 designs: • 1.5 litre Soapy water bottle with pump (placed at the water source) • 40 litre Bucket with tap, 10 L, basin, stool used as a stand, and soapy water bottle • 15 litre Kitchen bucket with tap, 8 L basin, stand, and soapy water bottle	The purpose of this study was to inform the design of a handwashing station for two subsequent randomised controlled trials (RCTs) in Bangladesh testing the health effects of handwashing.	Candidate handwashing stations were tested using trials of improved practices (TIPs), a formative research methodology. During Phase 1, follow-up semi-structured, qualitative interviews were completed with the participants within the week of installing the handwashing station, and then at days 7, 15, 30 and 45. Data collection procedures were similar during Phase 2, however, there were fewer follow-up visits and shorter follow-up periods: two follow-up visits in the urban area over a two week period, and three or four follow-up visits in the rural area over a three week period.	Qualitative data from interview transcripts were translated from Bengali to English. Responses from each household were compiled for each question in the interview guides, and then sorted according to each handwashing station design and study location. We sought to identify key factors making use of a given handwashing station acceptable and feasible. We defined acceptability to include appropriateness and satisfaction with the handwashing station, including an agreement to install, maintain, and use it to regularly wash hands. We analysed interview data according to the three main dimensions (Contextual, Psychosocial, and Technology) and the five

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			Candidate technologies were assessed in 2 phases: Phase 1: iterative testing and design adjustment. 40 of the recruited households in the urban site participated. 4 technologies were tested: • drum with tap water and soap container • bodna with soap • bottle (water only) with valve cap and soap container • soapy water bottle with cap and hole placed by the water source. The bottle with valve cap was not tested in the rural areas based on preliminary feedback. All 30 recruited households participated. Field research officers visited the corresponding households and installed the selected design at a suitable location in consultation with the family. They demonstrated the design's use and maintenance and informed about future visits to seek the family's ongoing consultation with regard to feasibility and acceptability based on experience with actual use. Findings from Phase 1 were used to inform the improved designs tried in Phase 2.			levels of the IBM-WASH framework. In order to code the qualitative data, four researchers analysed a subset each of the compiled responses and coded the transcripts line-by-line to identify key emergent themes. We compared these initial codes to determinants in an early iteration of the IBM-WASH framework. Using the refined constructs from the final iteration of IBM-WASH, we developed a final codebook for analysis of the interview data. All compiled responses were coded with the IBMWASH- based codebook using Atlas.ti Version 5.2.

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			Phase 2: the remaining 10 recruited urban households which had not yet tested a design were assigned the soapy water bottle with a pump. 19 of the participating households from Phase 1 in the rural site were assigned either the 40 L bucket with a tap, stand, basin and soapy water bottle with pump, or the 15 L version. There were 2 follow-up visits in the urban area over a 2-week period, and 3 or 4 follow-up visits in the rural area over a 3 week period. Classification: elements of psychosocial theory			
Jimenez et al., 2014 Study date: mid-2012 to mid-2013	Qualitative study	Region/country: Sub-Saharan Africa, Tanzania Target level: community Setting: rural Number of participants interviewed: 81 interviews or group discussions. 12 interviews were held with institutions at national level, 8 at regional level (3 regions), 26 at district level (6	WASH component: sanitation Promotional approach: - Community-wide approaches (or 'total sanitation' approaches) aim at a complete change in the behaviour of the community as a whole and not in individual household behaviour. They are inspired in the CLTS approach which aims to achieve and sustain an 'open defecation free' (ODF) status for the community. CLTS entails the facilitation of the community's analysis of their sanitation profile, practices of defecation and consequences through a 'triggering' exercise, leading to collective action and peer control to become ODF.	The object of analysis is the role of local government authorities (LGAs) in sanitation promotion.	Most of the interviews were held in Swahili. Notes were taken during each interview and were compared within the research team before transcription. A reduced number of specialists, both practitioners and researchers, were used as key informants.	The 'problem driven governance and political economy analysis' (PGPE) methodology was used. It is composed of three steps: (i) identifying the problem, opportunity or vulnerability to be addressed; (ii) mapping out the institutional and governance arrangements and weaknesses; and (iii) identifying obstacles to progressive change and understanding where a

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		districts) and 35 at ward and village level (9 wards and 15 villages).	Community-based innovation is promoted for the construction of latrines, which might not necessarily be improved. - Marketing of Sanitation Goods and Services: based on the social marketing concept (use of marketing strategies and techniques to achieve a social goal). Social marketing covers both the demand and supply for sanitation promotion and sees potential sanitation users as clients who need to be motivated to invest in a latrine. The services and products must be available at an affordable price in the right place. Classification: community-based approach			'drive' for positive change could emerge.
Katsi, 2008 Study date: unclear	Qualitative study	Region/country: Sub-Saharan Africa, Zimbabwe Target level: district Setting: rural Number of participants interviewed: men and women from Ward 22	WASH component: sanitation, water supply Promotional approach: In recognition of the huge costs to society of poor health as a direct result of unreliable water supply and inadequate hygiene, the community-based Management programme for water supply and sanitation was launched. Pilot projects were carried out in Chivi district in Masvingo province and were later extended to other districts countrywide in 1994-1997. In line with global trends and given the critical links	To show how the role of gender can impact on water supply and sanitation projects.	During group discussion, community members were grouped according to sex.	No information

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			between gender, water and sanitation, women's participation in rural water supply and sanitation projects was encouraged. All donor agencies used the Rural District Council (RDC) as the entry point for their operations. This represented a significant shift from a situation where communities used to be recipients of development to one where they were also part and parcel of development with gender mainstreaming as the integral part of the shift. Classification: community-based approach			
Kiwanuka et al., 2015 Study date: data from district annual reports between 1997-2011, focus group discussions in 2012	Qualitative study	Region/country: Sub-Saharan Africa, Uganda Target level: district Setting: rural Number of participants interviewed: 8 participants in Kamuli, 10 in Palissa	WASH component: WASH (general) Promotional approach: Several different types of technology to promote access to safe water, including natural spring protection, borehole rehabilitation, hand-augured wells and hand dug wells, and deep boreholes. Promotion of hygiene and sanitation mainly involved provision of education and construction of pit latrines. The project employed strategies to ensure sustainability which included community participation and ownership, involvement of women, use of affordable and maintainable technology, hygiene education and sanitation, but also	We sought to explore the factors that supported the sustainability of other community-based programmes in our study sites. This paper documents evidence of RUWASA's sustained programme achievements and identifies factors that explain its sustainability, and draws sustainability	Data collected from existing programme documents, key informant interviews and focus group discussions.	Data was recorded digitally, transcribed and translated into English by national researchers. Thematic analysis of interviews and focus group data was led by national researchers using a framework that focused on our programmatic concerns: determinants of sustainability. The themes identified were in line with the key issues that the research sought to address, such as

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			ensuring ongoing monitoring and evaluation. Classification: community-based approach	lessons for maternal health projects using a case study on the implementation of RUWASA programmes in Uganda.		community, organizational and broader socio-political factors underlying the sustainability of interventions. We analysed both facilitating factors, including visible benefits, as well as challenges encountered.
Langford & Panter-Brick, 2013 Study date: 2005	Qualitative study (mixed methods study)	Region/country: South Asia, Nepal Target level: household Setting: informal-rural Number of participants interviewed: 45 child-mother pairs (intervention) vs 43 child-mother pairs (control)	WASH component: hygiene (handwashing) Promotional approach: • Intervention: Handwashing programme intervention that was underpinned by the Theory of Planned Behaviour. The programme was launched in intervention areas at a community meeting organized in each local area. This meeting included an interactive educational session, a discussion led by the Community Motivator, and a short play, commissioned specifically for this intervention and performed by actors from the slum communities. The intervention was then intensively promoted for six months. The launch meeting was followed up by daily home visits by Community Motivators to each mother to encourage the establishment of a new hand-washing regime. These visits continued on a daily basis for two	In this paper, we critically reflect on the success of a community-based hygiene intervention and the insights gained through long term qualitative research embedded in programme evaluation. We focus this paper on qualitative data collected in the formative and evaluation phases of the intervention. We present these data to evaluate both the power of a social marketing approach and its limitations.	Three focus group discussions (2 h each) focussed on local perceptions of cleanliness and hygiene. The groups were moderated in Nepali by a research assistant specifically trained for this task, with comprehensive notes taken by a second Nepali assistant. The moderator, note-taker, and lead author met after each focus group to discuss findings. We focussed semi-structured interviews in intervention communities. Interviews lasted approximately 1 h and were not recorded; notes were taken throughout and written up into	Formative data were analysed collaboratively by the lead author with Nepali research assistants, to inform the design of the intervention. In-depth qualitative analysis built upon this first phase. This involved content analysis of all field notes, interviews, and focus group discussions, in English and Nepali, coded by hand to identify salient thematic categories, using an iterative process of comparison between all sources of ethnographic data. All names have been changed.

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			weeks, and then decreased in frequency until the mothers were visited just once or twice a week throughout the six-month intervention period. Mothers' group meetings were held in each area, with their local Community Motivator, every two weeks throughout the study period. The Community Motivators distributed a new bar of soap to each mother at these meetings to encourage handwashing practices in the family. Locally designed posters were distributed to all families in the intervention areas and were displayed prominently throughout the settlements. • Comparison: no promotional approach Classification: elements of psychosocial theory		comprehensive field notes immediately after. Qualitatively, we assessed attitudinal and behavioural change, as well as constraints on hygiene behaviour, with (i) participant observation, and (ii) in depth interviews. The lead author visited slums on a daily basis, taking up opportunities for informal observations and conversations, attended fortnightly mothers' group meeting, and convened regular meetings with CMs. Post-intervention, she conducted in-depth interviews with participants from intervention communities (n = 12, from total 45), purposively chosen to reflect relative poverty and engagement in the programme.	
Lansdown et al., 2002 Study date: March 1998 – February 1999	Qualitative study (mixed methods study)	Region/country: Sub-Saharan Africa, Tanzania Target level: school Setting: rural	WASH component: WASH (general) Promotional approach: • Intervention: Educational intervention. School teachers were introduced to active teaching methods as well as being given some knowledge on	The aim of the study was to produce a low-cost, sustainable approach to health education which would bring about	Focus groups with children, parents, teachers and other community members were conducted during the three school terms.	Two local Research Assistants were trained by A. L. in a 2-week workshop in focus group interviewing and observation methods.

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
		Number of participants interviewed: 8 pupils (4 girls and 4 boys) were randomly selected from groups of volunteers from 6 classes in each school.	parasitology and ways of preventing infection. After returning to their schools, teachers widened their work to include the importance of clean drinking water and good nutrition. In some schools the prevention of locally common diseases was taught. Songs, poetic dramas, short plays, visits and discussions were commonly used. All but one of the schools had motto boards or daily message boards. • Comparison: no promotional approach Classification: sanitation and hygiene messaging	behaviour change in schools.		
Lawrence et al., 2016 Study date: June – July 2013 and November – December 2013	Qualitative study	Region/country: Sub-Saharan Africa, Zambia Target level: community Setting: rural Number of participants interviewed: 174 participants (107 in 23 focus groups and 67 in-depth interviews).	WASH component: sanitation Promotional approach: CLTS begins at district level where respected individuals in the community (identified as "community champions") are trained to facilitate "triggering" (= a 2-3 hour process using hands-on exercises designed to persuade communities to realize that residents "eat their own faeces" because of poor hygiene and sanitation). The transect walk ("walk of shame") involves leading participants around their village and surrounding area to locate faeces resulting from open defecation. The faeces are brought back to the village and placed next to food where flies are observed moving	This study thus aimed to examine the sanitation beliefs and behaviours of CLTS participants and the perceived impact of CLTS on sanitation practices in districts where CLTS implementation was recently initiated in Zambia, to inform the development of sanitation programmes in the region.	Data were collected in two rounds. During June and July of 2013, IDIs and FGDs were conducted in three districts, all selected because they had varying durations of CLTS implementation. To gain a more in-depth understanding of the process of change and determinants of latrine construction, usage, and maintenance at the village level, a second round of IDIs were conducted in November and December 2013. One additional FGD	In round 1, we developed a coding system based on themes that emerged from the transcripts using inductive reasoning. The coding was done in Excel for Mac version 14.4.4 (Microsoft Corporation, Redmond, WA). As new themes emerged, codes were expanded and transcripts reread to ensure comprehensiveness and consistency of coding. During round 2, qualitative data were analysed using Nvivo

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			between faeces and food. After triggering, communities will usually decide to create a formalized sanitation committee and try to become ODF, leading to latrine building and waste management improvements. It is important that these decisions emerge from the community itself, rather than being imposed by the CLTS implementer. Classification: community-based approach		was conducted with CLTS champions and experienced sanitation and hygiene implementers from Lusaka Province.	version 10.0.418.0. (QSR International, Melbourne, Australia). The interviewers transcribed the original audio recordings and the master coder read the transcripts before analysis. Transcripts were then coded based on themes from analysis of the first data set. A second investigator read each transcript, providing additional perspectives in the synthesis of themes. Proportions of participants reporting specific behaviours or perceptions were calculated as appropriate. We also explored unusual responses to understand the full range of participants' experiences.
Malebo et al., 2012 Study date: March 2008 – March 2011	Qualitative study	Region/country: Sub-Saharan Africa, Tanzania Target level: community	WASH component: sanitation Promotional approach: MTUMBA approach: amalgamation of modified tools from PHAST, CLTS and PRA, and adapted to Tanzanian context: triggering, transect walk and community	The major aim was to monitor outcome and impact of the MTUMBA sanitation approach within the project districts and possibility for scaling	Semi-structured interview questionnaires and observational checklist were used to collect data from households. Interviews were conducted with local partners namely;	Data Management at NIMR is fully computerized. Prior to data entry, a data entry screen was created considering all instructions as stipulated

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
		Setting: rural Number of participants interviewed: over 1200 households across 3 districts	planning. Wide range of latrine options displayed in sanitation centres, which are targeted to meet community's preferences and needs derived from community opinions and propositions on latrine construction during the village meeting. MTUMBA approach focuses on community involvement through participatory planning, implementation, monitoring and evaluation, hence, it was purposively conceived to overcome the weaknesses noted in PHAST, CLTS and PRA by anchoring quality, quantity, equity and sustainability as key pillars. Pillars of MTUMBA sanitation approach: • quality: o increasing latrine standards o latrine promotion should focus on enabling households to have improved latrines and not any type of latrine • Equity: o ensuring that appropriate types of latrine are available in every household/institution to serve all including the vulnerable people such as elderly, disabled and small children.	up in other districts. The specific aims of the evaluation were to: 1) Measure the outcome of MTUMBA approach in terms of behaviour change and sanitation demand creation, 2) Measure the impact of MTUMBA approach in terms of gastrointestinal diseases trend, 3) Quantify cost implication of implementing MTUMBA approach per person, household or community, and 4) Establish social factor for choice of sanitation and hygiene technologies.	Local Government Authority for Nzega, Iramba and Mbulu districts and the CSOs involved in the previous Sanitation programmes viz. IrishAid rural project notably SEMA for Nzega, HAPA for Iramba and DMDD for Mbulu. Data were collected on the approaches used, coverage, and impacts on human health, behaviour change and its sustainability, programmes costs per person and per household and programme sustainability issues. Interview with artisans CSO formed in the project villages; information were carried out to collect data on their business model, cost charged 25 for construction of various types of latrine facilities, profit, bank accounts and money available.	on the respective survey forms followed by orientation of the data entry clerks. Data was managed through the Data Processing Unit (DPU) with one work station linked to a Database Server. The server keeps a copy of data from the DPU as well as acting as a backup for work completed at individual work stations within the building. The DPU use double entry system for data entry and the Software in use are Epinfo, and Microsoft Access. These softwares are programmed to check and control for common mistakes. The programmes provide data dictionary and batch editing facilities. Analysis work was done using statistical software named; Stata (Stata Co-operation, College Station, Texas, USA). All forms were double

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			o baseline survey is required at community level to understand sanitation status, extent and type of disabilities and problems they encounter before design is made. • Sustainability: o empowering community to continue accessing improved latrines even after the project tenure. MTUMBA approach uses village meeting to identify and select sanitation artisans and hygiene animators to be trained on 'Mtumba Sanitation and Hygiene Participatory Approach', followed by the construction of a sanitation centre in each ward, setting up formal latrine construction community based organisations, providing entrepreneurship skills and opening bank accounts. MTUMBA implementation process starts by entry and introduction to local government authority, training of the district sanitation team and collection of baseline data. Process starts with triggering meetings and transect walk followed by village wide discussion to fight open defecation and improve latrine construction in their community. The meeting resorts to action planning, making plan for			entered and verified (compared) using EPI-Info software. STATA was used in analysing entered data. Qualitative information from the districts was analysed manually.

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			implementation and monitoring and evaluation. Classification: community-based approach			
O'Donnell, 2015 Study date: 2013-2014	Qualitative study	Region/country: Sub-Saharan Africa, Somalia Target level: community Setting: urban Number of participants interviewed: 4 focus groups with 10 participants in each group, 425 participants (41.9% men and 58.1% women, representing 17 districts) of household survey	WASH component: WASH general Promotional approach: 2 complementary components: - pre-emptive community education delivered through interactive SMS on Polio prevention: 4 interactive daily SMS sessions (key community based disease prevention approaches, focusing on faecal oral transmission, that include handwashing and safe water chains). - distribution of water and sanitation items through SMS voucher redemption: communities received a code (mVoucher) on their phones via SMS which they can then redeem at appointed prequalified traders and exchange them for the specified Non Food Items (NFI) package. Once the code is redeemed, an automatic notification is sent by the mLink platform and the system immediately enrols the recipient to get education pertaining to the NFI item they have received through interactive SMS based sessions, including how to treat water using water treatment provided.	The objectives of the evaluation were therefore: • To identify changes (outcomes) mentioned in the proposal that have occurred in the target area during the period of implementation; and assess the contribution of the project, if any, to these changes • To gauge proof of concept of the mobile phone based approach for both interactive education as well as mVoucher based NFI distribution • To identify key lessons learned from the project and make suggestions for future phases	Stakeholder interviews, focus group discussions with participants in the mobile based initiative in Somalia and qualitative household survey with random population in the districts where the project was implemented. Stakeholder interviews were conducted by the lead evaluator in December 2014 with staff from the Oxfam Somalia programme and Regional Centre (in Nairobi) and humanitarian department (in Oxford). Interviews were also conducted with UNICEF (in Nairobi) and remotely with Hijra staff (both in Nairobi and Mogadishu) involved in the project.	No information

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			Classification: sanitation and hygiene messaging			
Pardeshi, 2009 Study date: December 2006	Qualitative study	Region/country: South-Asia, India Target level: district Setting: rural Number of participants interviewed: 416 households, including 1037 women; 4 focus group discussions (FGD) with 6 to 8 women in each FGD.	WASH component: sanitation Promotional approach: Total Sanitation Campaign (TSC): strong emphasis on Information, Education and Communication (IEC), Capacity Building and Hygiene Education for effective behaviour change with involvement of Panchayati Raj Institutions (PRIs, local self-government), Community Based Organisations (CBOs), Non-Governmental Organisations (NGOs) etc. Key intervention areas: Individual household latrines (IHHL), School Sanitation and Hygiene Education (SSHE), Community Sanitary Complexes and Anganwadi toilets. Classification: community-based approach	This case study describes the roles and responsibilities of women in TSC implemented in Yavatmal district of Maharashtra state.	Interviews were conducted with the TSC cell members to identify the role of women in the campaign. Focus group discussions (FGDs) were conducted with the women to study the benefits they perceived as a result of the campaign. Transect walks were conducted in the villages for on-field observations and discussions with the women at selected transect points.	At the end of the meeting the responses were summarised, checked for agreement and the women thanked for their participation. The FGD was analysed by preparing transcripts of the discussion, coding the major benefits and summarizing them for each level. All the information from the transect walks was analysed and recorded in a tabular format.
Rajaraman et al., 2014 Study date: 2011 – 2012	Qualitative study	Region/country: South-Asia, India Target level: village, school Setting: rural Number of participants interviewed: 174 households in	WASH component: hygiene (handwashing) Promotional approach: Intervention that sought to increase rates of handwashing with soap (HWWS) through messaging that was intended to: - increase perceived non-functional benefits of HWWS by linking the practice with emotional/psychological rewards of good parenting and aspirations for	In this paper, we report the findings of a mixed methods process evaluation which we conducted to explore the acceptability of the intervention, and to assess the fidelity of delivery and the extent to which the	The fieldworkers wrote qualitative descriptions of the activities they observed, noting the manner in which they were implemented, any problems in delivery, and any changes to the planned order of execution. Interviews were conducted in the local language, Telugu, through an English	The transcripts of the interviews were reviewed by the interviewer for accuracy and were analysed by the first author using NVivo software. Analysis was thematic by intervention component, and under the general themes of acceptability feasibility,

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
		intervention villages and 171 households in control villages	success (nurture and status) - increase perceived costs of not washing hands with soap by making salient the disgusting nature of routine hand contamination (disgust) - increase social pressure to practice HWWS by creating the impression that it is a normative behaviour (that most people do it and most people believe it should be done) (affiliation). Multiple mechanisms were incorporated for triggering and sustaining behaviour change. The intervention was designed to be scalable and to be delivered by a small team. The face of the campaign was 'SuperAmma', a forward-thinking, rural women who had a loving relationship with her son, taught him good manners and ensured HWWS amongst family members. Ladoo Lingam was an additional comic character who had disgusting habits and did not wash his hands with soap. SuperAmma featured in an animated film and both characters were used in street theatre. The intervention included components such as community events, monitoring of HWWS in schools and households, HWWS report cards and certificates for children, certificates and SuperAmma figures for mothers who pledged to practise HWWS and visual reminder stickers on front doors and bathroom	intervention had reached the target population and changed perceptions about HWWS. We also used the findings to inform the design of the short version of the intervention, and we estimated the costs of the long and short versions to inform discussions about scalability.	speaking translator and were digitally recorded and transcribed in English.	impact, and suggestions for improvement. Two of the study authors (DR and KSV) attended all intervention events and took detailed qualitative field notes on the quality of implementation in the second and sixth villages to receive the intervention. The qualitative data were manually coded under the general themes of acceptability (things liked and not liked), feasibility (barriers and facilitators), impact (positive and negative), and suggestions for improvement.

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			walls. The activities and messages were delivered through community events, an event in the state run day care centre for pre-school age children (Anganwadi centre), sessions at the village primary school, small group meetings with men and women in the village, and awareness generation activities including a children's rally, putting up posters around the village and household visits. Classification: elements of psychosocial theory			
Rheinländer et al., 2012 Study date: 18 month period during 2008 and 2009	Qualitative study	Region/country: South-East Asia and Oceania, Vietnam Target level: community Setting: rural Number of participants interviewed: 56 stakeholders from 4 different administrative levels	WASH component: sanitation, hygiene Promotional approach: Institutional and promotional strategies and constraints including the roles and responsibilities of stakeholders involved in rural hygiene and sanitation promotion. The study is part of the SANIVAT project ('Water supply, sanitation, hygiene promotion and health in Vietnam'). Classification: community-based approach	The current study investigates institutional and promotional strategies and constraints including the roles and responsibilities of stakeholders involved in rural hygiene and sanitation promotion (RHSP) in a multi-ethnic population group in a Northern province of Vietnam. The study provides important lessons learned for future	Semi-structured interviews were conducted with stakeholders from the four different administrative levels and represented the health, education and agriculture sectors and unions actively involved in RHSP. Interviews lasted between 45 and 60 minutes and were conducted in English or Vietnamese assisted by English-speaking translators.	Interviews were recorded either digitally or in comprehensive notes and transcribed ad verbatim into English. Manual content analysis was performed by the two principal researchers by organizing all interview text into pre-set (from the interview guide) and emerging themes. Findings were then compared for stakeholders within and across sectors (health, education, agriculture), mass organizations and administrative levels

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
				RHSP in Vietnam and informs regional and global strategies for health promotion programming targeting multi-ethnic populations.		(province, district, commune and village) to identify similarities and differences in perceived roles and responsibilities, challenges and strategies in RHSP.
Sarker & Panday, 2007 Study date: 2001 – 2002	Qualitative study	Region/country: South Asia, Bangladesh Target level: village Setting: rural Number of participants interviewed: 100 members of 4 VDCs	WASH component: WASH (general) Promotional approach: Mobilize and empower Village Development Committees (VDCs), develop and market affordable technology through private sectors, provide health education aimed at behavioural changes related to hygiene, and develop team and spirit of partnership of implementing and supporting organisations. Build capacity of the target people by using the method of participatory approach to make them self-reliant so that they can solve their water and sanitation problems through their own effort, utilizing the local resources. Classification: community-based approach	The main objective of this paper is to examine the extent to which VDCs have been able to solve the WatSan problems to get rid of waterborne diseases and arsenicosis in rural Bangladesh.	The study used surveys, observations, focus group discussions (FGD), and case studies to get reliable as well as in-depth information.	No information
Schouten & Mathenge, 2010	Qualitative study	Region/country: Sub-Saharan Africa, Kenya	WASH component: sanitation Promotional approach: Communal sanitation for slums:	Due to the lack of information from literature, the objective of this paper is to make	The field work for this study entailed collection of data from both the communal sanitation services providers and from the	No information

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
Study date: unclear		Target level: community Setting: informal-rural Number of participants interviewed: 16 interviews to obtain providers' views on communal sanitation facilities. With respect to the perspective of the communal sanitation users, 76 surveys were collected.	• VIP latrine: hole in the ground for depositing excreta. The hole is lined with concrete to allow for emptying the excreta. Furthermore, it consists of a squatting platform and a vent pipe with a wire mesh for eliminating odour and flies. • Pour flush latrine: connected to a septic tank, a pit or to the sewer system simplified or conventional. It has a pan with a water seal to prevent odour, flies and mosquitoes. The seal is a U-shaped conduit partially filled with water. Flushing is manually done by pouring 1-3 L water in the pan. • WC toilet: squatting pan with a water seal from which excreta is flushed away with a ± 9 L if water stored in an automatically refilling cistern. The toilets are connected to a system of pipes which collect and transport the wastewater to the waste water treatment plant. • biogas toilet: shallow pit, bio digester and vent pipe equipped with a fly screen for control of odour and flies. Excreta are deposited in the pit which is connected to the bio digester. Waste is digested anaerobically in the bio digester to produce methane gas. After methane production, the sludge is deposited in a pit or a septic tank,	available knowledge in the field of communal sanitation concerns of slum dwellers. Our prime interest is to find out the key factors that determine, for multiple stakeholders, the appropriateness of a communal sanitation facility.	users of these facilities. Various methods were employed, namely semi structured interviews, questionnaires, observation, photography and document review.	

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			which is emptied after a specific period. Classification: community-based approach			
Silali & Njambi, 2014 Study date: 3 month study period	Qualitative study	Region/country: Sub-Saharan Africa, Kenya Target level: other (Trans-Nzoia county) Setting: no information Number of participants interviewed: 297 respondents in four divisions.	WASH component: WASH (general) Promotional approach: 14 out of 27 integrated public water programmes in the District. Matters of one point water sources mapping in relation to population health and the utilization of pit latrines by locals was confirmed by checking foot paths in an observation survey by chief researcher during Transect walk. Classification: community-based approach	The study sought answers to the following questions: 1) How does level of education among households attained and type of community participation influence empowerments sustainability of integrated water resource management programmes in the community? 2) Does population health utilize and apply (WASH) concepts in reality (e.g. washing of hands after visiting the latrines)? 3) How many households have access to one water source?	A cross-sectional design, using mixed data collection procedure (quantitative and qualitative research) was conducted, within 3 months of study period. Structured questionnaire, Key Informant Interviews KII guides, Focus Group Discussion, FGD guides were used via canvasser methods.	Qualitative data, themes and sub-themes were discussed to saturation points, while original words of discussants were retained as captions in boxes.

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
				4) How does Knowledge, Attitude and Cultural Practice influence sustainability of integrated water and health programmes to supply safe water?		
Smith et al., 2004 Study date: unclear	Qualitative study	Region/country: Sub-Saharan Africa, South Africa Target level: community Setting: informal-rural Number of participants interviewed: 300 heads of households	WASH component: WASH (general) Promotional approach: First steps to project success: community mobilization and collaboration. City officials were consulted to gain acceptance of the project. Three communities were targeted: Cato Crest, Palmiet Road and Kenney Road. Transitional nature of each community precluded an official census. Each community had its own informal internal hierarchy, despite the fact that they each were under the governmental rule of city officials of the greater Durban metropolitan area. Each community had a male leader who was recognized by residents and city officials alike. This individual was invited to be a part of the community mobilization model. A meeting was held with each community leader to gain acceptance and access for data collection and participation in the project by community	The purpose of the research study was to identify sanitation needs from the perspective of the informal community residents. The study was part of a multiple-step process that addressed issues related to needs identified through data analyses and that would empower Zulu and Xhosa women.	The project director, who was skilled in conducting focus groups and working with this population, directed the focus group. Discussions took place primarily in English The project director used reflexive critique with participants to clarify and make explicit issues and processes of the group. Reflective dialogue was used to promote exploration of alternative explanations and interpretations. This type of exploration led the group to greater insight and allowed participants to further identify and prioritize needs of the community in which they lived. All data were collected at this 3-hour Durban group session. The	The project director carried the raw data back to the United States where the research team organized the numerous notes taken during the focus groups. Copies of each set of notes were distributed to each individual MTSU team member. Team members independently reviewed the notes over approximately 3 weeks. In joint meetings, members collectively reread the focus-group notes to clarify the data. Regular meetings were held over approximately 6 weeks to allow the team to use a reiterative process for data analyses. In this way,

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			residents. Education of a maximum number of women in each community was facilitated by use of a pyramid approach. Each community had a designated female programme leader (specific to this project) who was selected by the project director in collaboration with the male community leader. Programme leaders were key individuals in the project and recognized as female community leaders among the women. She was the key contact between the research team and the community they represented, and worked with 8 female community health educators, who were selected on the basis of their interest in the project and were responsible for conducting workshops in the community. 16 workshops in each community (over approximately 5 months) were held in community centres and outside in open areas in good weather with minimum 10 participants. Sanitation topics: cleaning to eliminate flies in the home, removal of trash to eliminate rodents, methods to decrease bacterial contamination of foods, and ways to make water safe for drinking. Workshop participants shared information with 2 other family members within 1 week of completion.		focus group yielded qualitative data that was later analysed by the research team when they returned to the United States.	theoretical considerations were derived from the practical accounts given by focus-group participants. Issues of concern were identified during these group meetings; detailed observations made by the project director were considered during the data analysis.

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			Classification: community-based approach			
Whaley & Webster, 2011 Study date: 2010	Qualitative study (mixed methods study)	Region/country: Sub-Saharan Africa, Zimbabwe Target level: household Setting: no information Number of participants interviewed: 100 households (intervention) vs 103 households (control)	WASH component: hygiene (handwashing), sanitation Promotional approach: • Intervention: Community Health Clubs (CHC's). A 'horizontal' approach, seeing the problem of disease as a social and structural issue and addressing a raft of 20 health issues, from HIV/AIDS and malaria to pit latrines, handwashing and refuse pits. CHC's are open for anyone to join, operate over a period of six months where club members gather weekly at a meeting point to discuss and debate a particular health topic. The session is led by a trained facilitator, sometimes from the community, who incorporates the use of pictorial cards displaying images of good and bad health practices into the discussion. Information and ideas are often expressed through song, dance, poetry and drama. The 6 months culminates in a 'model home competition'. • Comparison: Community-Led Total Sanitation. A 'vertical' approach concerned solely with the achievement of open defecation-free communities and the crucial practice of handwashing	This study aims to analyse and compare the effectiveness and sustainability of CHCs and CLTS in Zimbabwe, and so act as the first step towards bridging this knowledge gap.	Key informant interviews: semi-structured interviews with questions relating to the effectiveness and sustainability of the two approaches. The majority of interviews were conducted in English, with the exception of three CHC facilitators and two Plan community health workers, where a Shonaspeaking translator was used. Fieldwork: data were collected over a period of seven weeks during 2010. Data collection: data were collected by one team of two people during unannounced visits to the communities. The team consisted of a researcher and a translator. Initially, a feasibility study involving a short survey, semi-structured interviews and focus groups was carried out in ward 17 of Chiredzi district (which was outside the study area) from which	Interviews were recorded digitally and transcribed. Transcripts were read and re-read, and responses coded to create a set of concepts and themes. Further analysis was performed on this secondary data set resulting in the emergence of overarching themes. Whole interviews were again read to re-contextualise the results of the coding process.

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			with soap. A single day of 'triggering' and a number of post-triggering follow-up visits, where facilitators enter a community and, by using a selection of tried and tested techniques, elicit emotions such as shame, embarrassment and disgust from villagers as they realise that by practising open defecation they are in essence eating each other's faeces. This revelation is designed to bring about a transformation in the community who vow to come up with a plan to stop open defecation, which usually involves the construction of temporary toilets from locally available resources. Classification: community-based approach		questions and approaches were refined. Interviews and focus groups: Semi-structured interviews and small focus groups involving two to three participants were conducted with project beneficiaries in order to understand the motivation for behaviour change observed with respect to sanitation and hygiene practices, and factors that influenced the relative effectiveness and sustainability of the interventions. During the survey in Chiredzi district participants were asked if they would be happy for the researcher to return for a more in-depth interview concerning health, sanitation and hygiene. Based on the data from the survey the interviews and focus groups attempted to vary the 'type' of participants included so as to incorporate a range of perspectives.	

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
Xuan et al., 2013 Study date: Formative research project: July – November 2008; Action research project: May, September – December 2010	Qualitative study	Region/country: South-East Asia and Oceania, Vietnam Target level: school Setting: rural Number of participants interviewed: semi-structured interviews with 15 children and their parents, focus group discussions with 32 schoolchildren and 20 school staff and observations during 15 HWWS involving children.	WASH component: hygiene (handwashing) Promotional approach: Types of HWWS promotional activities during school time: in-class lectures, guidance from student's advisors during group demonstrations or talks at school meetings and by school principals during common Monday school meetings. HWWS promotional activities were performed once a month in each class and for all classes during weekly school meetings over the course of 4 weeks. 35 HWWS promotional activities were carried out in the 4 schools over this period. All children (566) received 2 copies of the leaflet on HWWS in Kinh language to take home to show their parents. Classification: sanitation and hygiene messaging	This study was therefore conducted to investigate responses to a teacher-centred participatory HWWS intervention in schools with ethnically diverse schoolchildren in northern rural Vietnam. The findings can add to the limited knowledge about how to involve schools in designing and implementing active school-based hygiene interventions, including how to initiate HWWS behaviour change among schoolchildren and their families.	A research team including the first author and four research assistants conducted the study. Observations carried out at home and at the school in the formative phase of the study were conducted by the same research team. Observations of HWWS activities and semi-structured and open interviews with children, parents and head teachers during the intervention were all conducted in Vietnamese by the first author assisted by one research assistant seated in a private area, either at school or at home. All semi-structured interviews and FGDs were tape-recorded and the recordings were transcribed ad verbatim into Vietnamese text by a research assistant.	Interview and observational data were all entered and analysed using NVivo software. Codes were developed during the whole process of data analysis, emerging from the empirical data and inspired by concepts from literature. Main codes included: (1) hygiene teaching methods, (2) experiences with the HWWS intervention, (3) HWWS practice transfer and (4) perceived barriers to create and sustain HWWS behaviours of schoolchildren.
Yeager et al., 2002 Study date: October 1996	Qualitative study (mixed methods study)	Region/country: Latin America and Caribbean, Peru Target level: community	WASH component: sanitation Promotional approach: • Intervention: Introduce the topic of potty use to mothers with young children who attend the health centre and in the	We report here our experiences of designing an intervention to promote hygienic stool disposal	Initial interviews were conducted with CRED personnel to discuss the project and its implementation, and to obtain suggestions for	Data were entered and checked using FoxPro.

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
– March 1997		Setting: urban Number of participants interviewed: 285 households (intervention) vs 293 households (control)	outreach activities that CRED (Growth and Development Program) staff were required to carry out. Three opportunities in which intervention messages could be delivered were CRED consultations, in the outreach activities of the CRED personnel and in the waiting rooms of the health centres. A 20 min video, with a focus on the key issues of potty use and clearance of stools from the home environment, was intended for use both in health talks in the community and in the waiting areas of the health centre. In the video, a toddler who gets diarrhoea through contact with faeces of the neighbour's toddler, gets treated at the health centre where the problem and solution are explained. The neighbour switches to potty use and to using CRED facilities. These issues are contained in a soap opera story. A song was developed for the beginning and the end of the story. This song was taped and interspersed with other songs so it could be played in the health centre waiting rooms. A pamphlet presented, along with other key messages, the 4 steps to potty training ((1) recognizing gestures for wanting to defecate, (2) teaching child to say ca-ca when s/he makes these gestures, (3) show child the potty when	practices in a densely populated shanty town area of Lima, Peru. We also describe the implementation of this intervention, which was delivered through the routine health services, and discuss the findings from process and impact evaluations.	delivery of the intervention's messages - the intention being to integrate the intervention with existing practices in the CRED service and minimize extra burden on staff. Various types of data were collected to monitor the intervention's implementation. Exit interviews were conducted with mothers leaving the health centre, consultations with CRED personnel were observed, pertinent data from the routine statistics were extracted and records were kept of relevant activities such as the number of video presentations made.	

Reference and study date	Study design	Population	Intervention	Aim of the study	Methods of data collection	Methods of data analysis
			s/he asks to defecate, (4) teach child gradually to use potty, helping by keeping him/her company). Pamphlets were made available in CRED consulting rooms and distributed at community talks. • Comparison: no promotional approach Classification: sanitation and hygiene messaging			

Table 45: Barriers and facilitators in the category "Process evaluation factors"

Process evaluation factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
ACCEPTABILITY				
Barriers		Habits		Safety risk
		Mindset		
Facilitators				Entertainment
				Cooperation
DOSE				
Barriers	Long messages	Short programme duration		Long messages
	Short programme duration	Lack of follow-up		
Facilitators	Intervention duration	Relevant messages		Visit frequency
		Step-wise approach		
		Visit frequency		
		External visit		
		Broad approach		
		Regular structure		
ENGAGEMENT				
Barriers	Lack of enthusiasm	Habits	Lack of communication	
	Lack of interest	Personal career of the implementer		
		Lack of follow-up		
		Overlap with other programmes		
Facilitators		Enthusiasm		

		Income generating activities		
		Leadership		
		Praise		
FIDELITY				
Barriers				School closures
REACH				
Barriers			Small scale of the intervention	
Facilitators	Intention	Motivation		
SATISFACTION				
Barriers	Lack of interaction	Lack of collaboration	Inappropriate attitude of the implementer	
		Lack of privacy		
		Criticism		
		Effectiveness		
		Cost	Repayment method and process time	
		Lack of training of the implementer		
		Politics		
		Lack of communication		
Facilitators	Interaction	Training/qualification of the implementer	Participation	Design of the hardware
	Innovation	Respect Feeling proud	Collateral benefit	

Table 46: Barriers and facilitators in the category "Programme environment factors"

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
TRAINING MATERIALS				
Barriers	Safety	Availability	Availability	Availability
				Cultural insensitivity
Facilitators	Availability	Availability		
		Distribution		
COMMUNITY CAPACITY				
Barriers	(Lack of) dissemination	Lack of accountability		
		Lack of support		
		Lack of involvement		
		Lack of capacity building		
		Paternalistic inertia		
		(Lack of) sense of ownership		
Facilitators	Dissemination	Support		
		Dedication		
		Guidance		
		Capacity building		
		Leadership		
		Sense of ownership		
		Multiplier effect from parents to children		

		Self-financial management capacity		
FUNDING/RESOURCES				
Barriers		Limited financial, technological, facilitation capacity	Limited financial, technological, facilitation capacity	
		Payment modalities	Late payments	
Facilitators	Fundraising	Financial assistance		
		Fundraising		
		Use of local/traditional building materials		
		Affordability		
		Income-generating activities		
		Payment modalities		
INTENT OF A PROGRAMME TO CHANGE A SPECIFIC OUTCOME				
Facilitators		Mentality		
LEADERSHIP OF IMPLEMENTING ORGANIZATION				
Barriers		Decision making		
		Collegial support		
Facilitators		Open discussion		
PARTNERSHIP, COORDINATION BETWEEN PROVIDERS OF THE SAME INTERVENTION OR OTHER HEALTH INTERVENTIONS				
Barriers		Lack of partnerships between members	Lack of communication	
		Lack of partnerships with government/NGO		
		Lack of partnership with private sector		

		Lack of inter-sectoral collaboration		
		Lack of coordination		
		Lack of information	Lack of involvement	
		Lack of communication		
		Limited quality of the implementers		
		Lack of responsibility		
Facilitators		Coordination	Partnerships with government/NGO	
		Decentralization		
		Partnerships with government		
TRAINING/QUALIFICATION OF THE IMPLEMENTERS				
Barriers	Lack of financial resources	Lack of financial resources		

Table 47: Barriers and facilitators in the category "Implementer-related factors"

Implementer-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
AWARENESS ABOUT COSTS AND BENEFITS				
Barriers			Competitors on the market	
Facilitators			Sustainability of the loans	
			Awareness about costs	
MOTIVATION				
Barriers			Amount of commission received	
Facilitators		Feeling of responsibility		
PLANNING SKILLS				
Barriers	Time constraints	Time constraints	Time constraints	
	Other priorities		Bureaucratic loan application process	
OTHERS SHOWING BEHAVIOUR				
Barriers	Lack of cooperation			
Facilitators	Multiplier effect	Behaviour as teachable moment		
PUBLIC COMMITMENT				
Barriers			Lack of commitment	

Table 48: Barriers and facilitators in the category "Recipient-related factors"

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
AWARENESS ABOUT COSTS AND BENEFITS				
Barriers		Awareness about costs		Time constraints
		Awareness about benefits		Awareness about costs
				Lack of importance attached
Facilitators	Improved health	Improved health	Availability of loans	Improved cleanliness
	Use of new technologies	Improved cleanliness	Surplus resource generation	
		Surplus resource generation	Saving space	
MOTIVATION				
Barriers		Other priorities	Prior loans	Other priorities
		Habits		
		Feeling of undervaluation		
Facilitators		Sense of ownership		
PLANNING SKILLS				
Barriers		Time constraints		
Facilitators		Political climate	Applying risk reduction strategies	
AWARENESS OF PERSONAL RISK				
Barriers		Unawareness of the spread of the disease		Unawareness of the spread of the disease
Facilitators	Awareness of the spread of the disease	Awareness of the spread of the disease	Awareness of the financial risk	Awareness of the spread of the disease
		Feelings of shame and disgust		
KNOWLEDGE				

Barriers			Lack of financial knowledge	
Facilitators		Knowledge of hygiene behaviour		
NORMS				
Barriers		Lack of social control		
Facilitators		Social control		Social control
OTHERS SHOWING BEHAVIOUR				
Barriers		Competition inducing disappointment		
Facilitators		Other community member's behaviour	Other community member's behaviour	
		Household member's behaviour		
		Competition inducing enthusiasm		
PUBLIC COMMITMENT				
Barriers		Religion		
Facilitators		Identity formation		Pledge taking
SELF-EFFICACY				
Barriers		Low initial self-efficacy		
Facilitators		Simplicity of the new behaviour		
		Self-efficacy		

Table 49: Barriers and facilitators in the category "Implementer-related contextual factors"

Implementer-Related Contextual Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
PERSONAL: DEMOGRAPHIC VARIABLES				
Barriers		Implementer not part of the community		
		Gender		
Facilitators		Implementer part of the community		
SOCIO-CULTURAL: DIGNITY AND RESPECT				
Barriers			Lack of kindness and respect	
Facilitators		Kindness and respect		
		Trust		
SOCIO-CULTURAL: INFORMATION ENVIRONMENT				
Barriers			Clarity and completeness of the information	Sponsorship transparency
Facilitators		Continued availability and accessibility of the implementer	Continued availability and accessibility of the implementer	
SOCIO-CULTURAL: LAW-LEGISLATION				
Barriers		National NGO legislation		
		Laxity in law implementation and enforcement		
		Corruption		
Facilitators		Informal local legislation		
SOCIO-CULTURAL: SOCIOECONOMIC STATUS-ROLE MODEL-AUTHORITY				
Barriers		Implementer's authority/status		Implementer's authority/status
Facilitators		Implementer's authority/status		Implementer's authority/status
SOCIO-CULTURAL: SOCIAL CAPITAL				

Facilitators		Developing a culture of sharing resources and cooperation		
SOCIO-CULTURAL: SOCIAL-POLITICAL ENVIRONMENT				
Barriers		Political interruption of the intervention		
PHYSICAL: AVAILABLE SPACE				
Barriers		Accessibility of the facilities		
PHYSICAL: NATURAL AND BUILT ENVIRONMENT				
Barriers		Members of Community Health Clubs not representative for community		
		Lack of financial resources		
PHYSICAL: PLACE OF RESIDENCE (RURAL VS URBAN)				
Barriers		Transportation difficulties		
PHYSICAL: REMOTE AREAS				
Barriers		Hard to reach areas		

Table 50: Barriers and facilitators in the category "Recipient-related contextual factors"

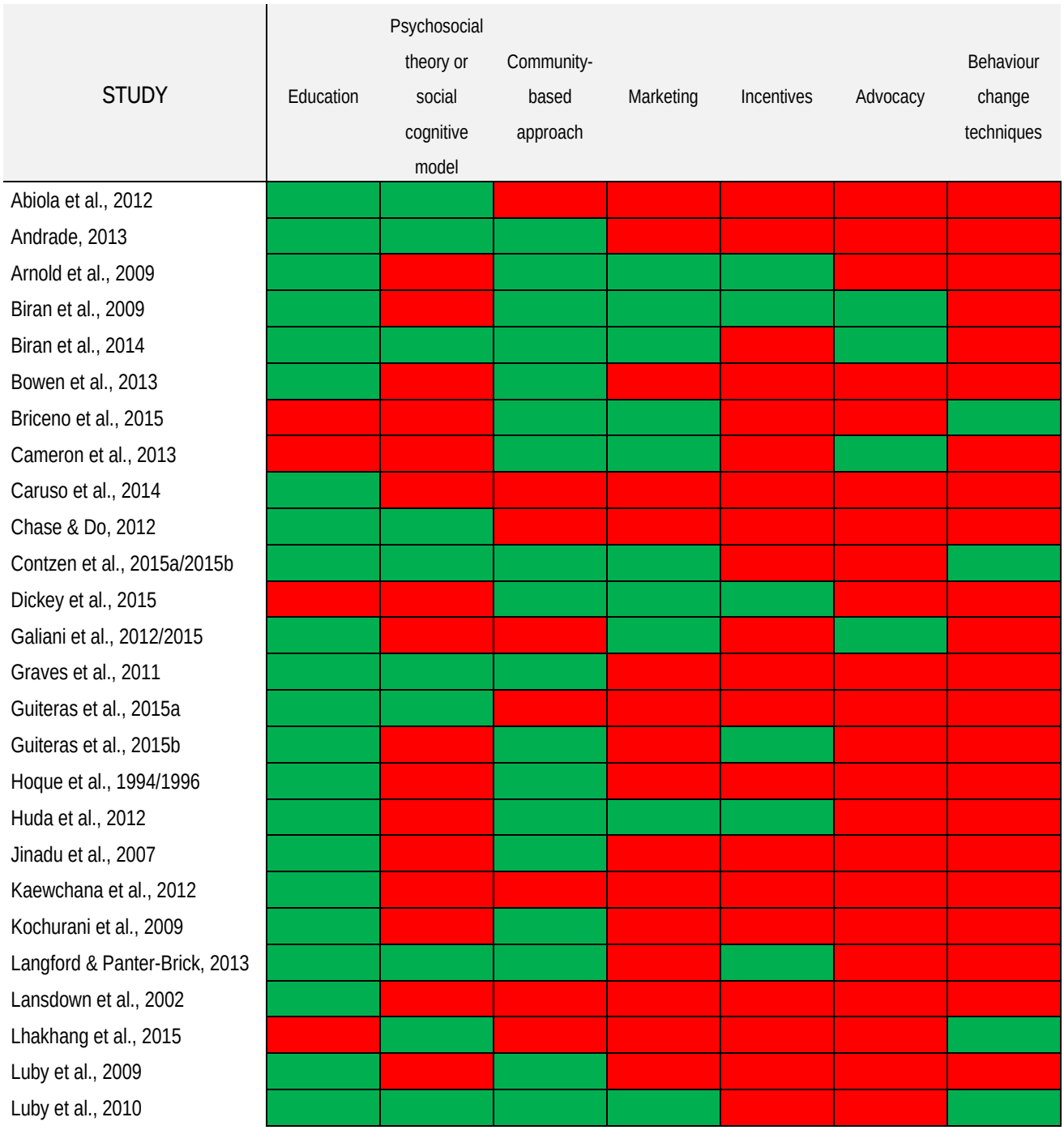
Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
PERSONAL: DEMOGRAPHICS				
Barriers	Age (younger)	Gender (male)		Age
		Gender (female)		
		Education		Occupation
Facilitators		Gender (female)		Gender (female)
		Female privacy improvement		
		Age (youth)		
PHYSICAL: AVAILABLE SPACE				
Barriers		Densely populated areas		Small living quarters
Facilitators			Space-saving benefits	
PHYSICAL: LOW VS MIDDLE-INCOME COUNTRIES				
Facilitators			High-income villages	
PHYSICAL: NATURAL AND BUILT ENVIRONMENT				
Barriers		Lack of maintenance of the infrastructure	Complexity	Lack of visibility
		Lack of quality of the infrastructure		Lack of access to handwashing station
				Small capacity
		Insufficient access to necessary materials		Renter change
		Type of soil		Dirtiness
		No access to clean water		

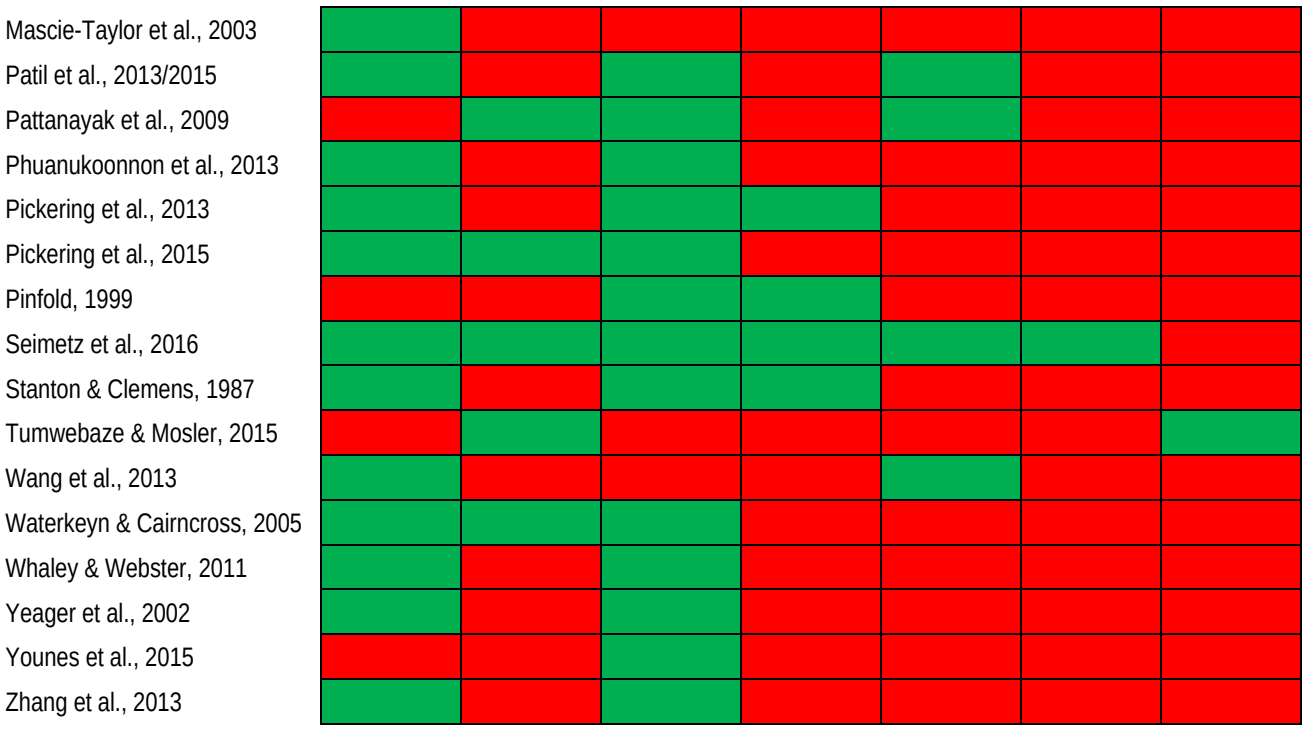
Facilitators		Cleanliness	Quality of the infrastructure	Visibility
				Access to water
		Open space	Climate	Availability of replacement parts
PHYSICAL: PLACE OF RESIDENCE				
Barriers	Highland areas	Area of conflict		
Facilitators			City centers	
PHYSICAL: REMOTE AREAS				
Barriers	Remote areas	Remote areas		
PHYSICAL: SAFETY				
Barriers	Safety			
SOCIO-CULTURAL: CULTURE				
Barriers	Language	Stubborn against change in habits		
		Traditions and taboos		
		Cultural background		
SOCIO-CULTURAL: DIVISION OF LABOUR				
Facilitators		Division of labour		
SOCIO-CULTURAL: ETHNICITY				
Barrier		Ethnicity		
SOCIO-CULTURAL: LAW/LEGISLATION				
Barrier		Corruption		
		By-law		
		Crime		
Facilitator		By-law		
SOCIO-CULTURAL: MINORITIES				
Barrier		Language		

		Traditional ethnic life styles		
SOCIO-CULTURAL: SOCIOECONOMIC STATUS – ROLE MODEL - AUTHORITY				
Barriers	Poverty	Poverty	Poverty	
	Illiteracy	Lack of hierarchical pressure		
Facilitators		Social status	Role models from the community	
		Hierarchical pressure		
		Leadership development		
SOCIO-CULTURAL: SOCIAL CAPITAL				
Facilitator		Social connection	Developing a culture of cooperation	
		Availability of solidarity mechanisms		

11 Figures not included in main text

Figure 5: Promotional elements present in the interventions of the 41 included quantitative studies





green: promotional element present in the program; red: promotional element not present in the program.

Figure 6: Main categories of promotional approaches with detailed indication of WASH component and specific promotional approach for each included quantitative study.

Community-based approach (13 studies, 16 interventions)	Social marketing approach (7 studies, 10 interventions)	Sanitation and hygiene messaging (15 studies, 19 interventions)	Elements of psychosocial theory (7 studies, 11 interventions)
Andrade (2013) Community-based hygiene promotion intervention (school level) 	Arnold et al. (2009) Water treatment and handwashing campaign 	Abiola et al. (2012) Health education intervention (school level) 	Biran et al. (2014) SuperAmma programme 
Guiteras et al. (2015b) 1) Latrine Promotion program (LPP)  2) LPP+subsidy  3) Supply only 	Biran et al. (2009) Soap promotion and hygiene education campaign  Briceno et al. (2015) 1) The Handwashing With Soap Intervention  2) Total Sanitation (CLTS) and Sanitation Marketing Campaign 	Bowen et al. (2013) 1) Handwashing intervention  2) Handwashing + water treatment intervention  Caruso et al. (2014) 1) Handwashing + latrine cleaning intervention (part of the SWASH+ project) (school level) 	Chase & Do (2012) Handwashing interpersonal communication campaign (HWIPC campaign)  Contzen et al. (2015a + 2015b) 1) Education + public commitment + reminder  2) Infrastructure promotion intervention with reminder 

4) LPP+subsidy+supply

Hoque et al. (1994/1996)
A water and sanitation project (as part of the Mirzapur handpump project)

Huda et al. (2012)
SHEWA-B programme

Jinadu et al. (2007)
EDEE Intervention Package

Kochurani et al. (2009)
School Sanitation and Hygiene Education project (school level)

Patil et al. (2013/2015)
India's Total Sanitation Campaign

3) Total Sanitation (CLTS) and Sanitation Marketing Campaign and The Handwashing With Soap Intervention

Cameron et al. (2013)
Total Sanitation (CLTS) and Sanitation Marketing campaign

Dickey et al. (2015)
Sanitation Marketing Programme

Galiani et al. (2012/2015)
1) Global Scaling Up Handwashing Project (province level)

2) Global Scaling Up Handwashing Project (district level, school level)

Pinfold et al. 1999
A hygiene intervention (school level)

2) Handwashing intervention (part of the SWASH+ project) (school level)

Graves et al. (2011)
NICHE project HW

Guiteras et al. (2015a)
Educational intervention

Kaewchana et al. (2012)
HITS Study

Lansdown et al. (2002)
The Lushoto Enhanced Health Education Project (school level)

Luby et al. (2009)
1) Handwashing promotion

3) Education + public commitment with reminder + infrastructure promotion with reminder

Langford et al. (2013)
Handwashing programme intervention

Lhakhang et al. (2015)
Motivational + self-regulatory intervention

Luby et al. (2010)
1) Soap intervention

2) Hand sanitizer intervention

Tumwebaze & Mosler (2015)
1) Group discussions (RANAS model)

Pattanayak et al. (2009)
IEC campaign

Phuanukoonnon et al. (2013)
Community-based WASH intervention

Pickering et al. (2015)
CLTS programme

Waterkeyn & Cairncross (2015)
CHC's and PHAST activities

Whaley & Webster (2011)
CHC and CLTS

Younes et al. (2015)
Participatory women's groups

2) Handwashing promotion and additional water treatment intervention

Mascie-Taylor et al. (2003)
Educational approach

Pickering et al. (2013)
1) Hand sanitizer intervention (school level)

2) Soap intervention (school level)

Seimetz et al. (2016)
The Great WASH Yatra handwashing awareness raising campaign

Stanton & Clemens (1987)
Educational messaging

2) Group discussions + public commitment (RANAS model)

Wang et al. (2013)
Health education intervention

Yeager et al. (2002)
CRED programme

Zhang et al. (2013)
Tippy Tap Handwashing

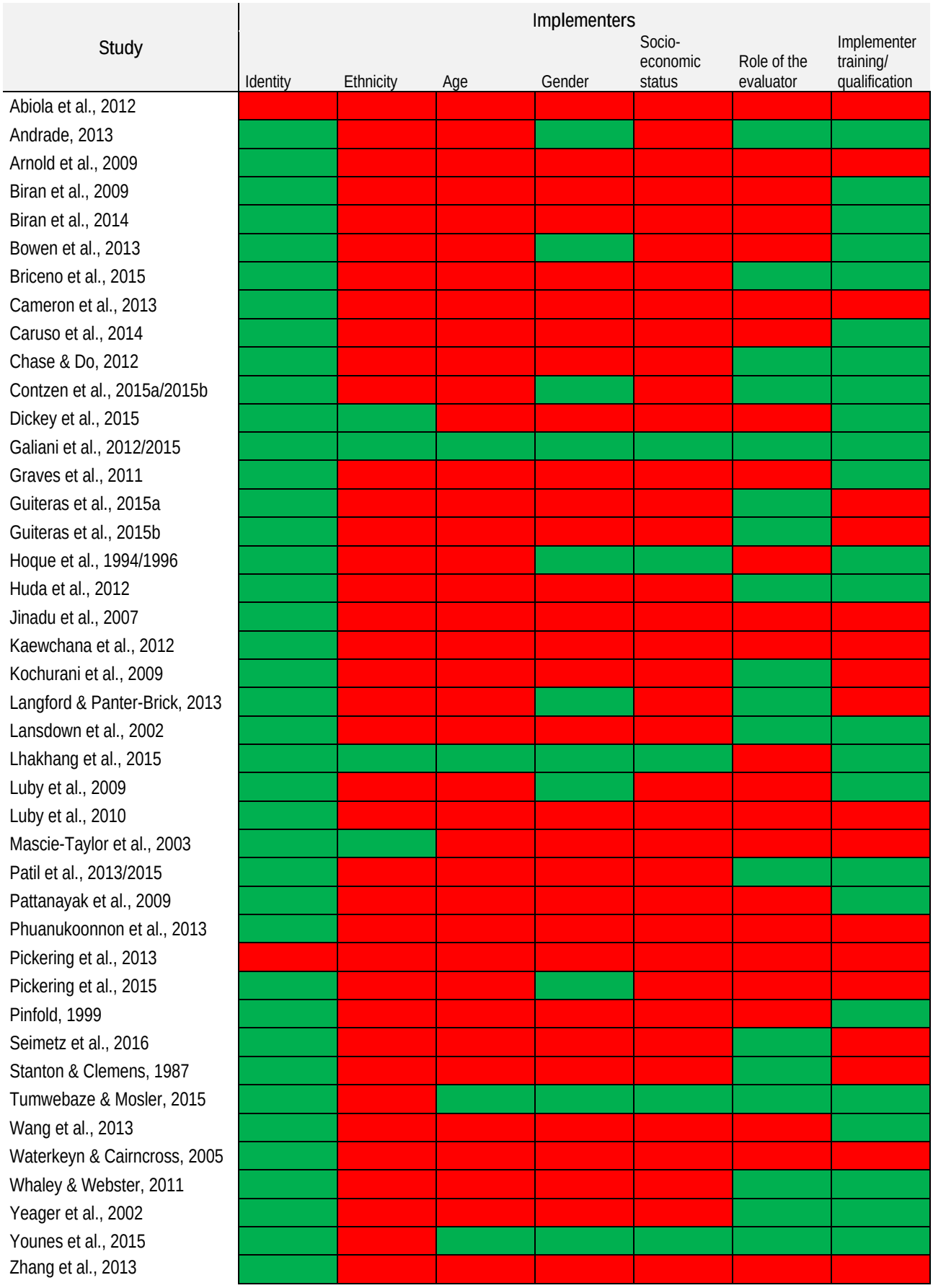
CHC: Community Health Clubs; CLTS: Community-led total sanitation; CRED: Growth and Development Program; HITS: Household Influenza Transmission; IEC: Information, Education and Communication); NICHE: Nyando Integrated Child Health Education PHAST: Participatory Hygiene and Sanitation Transformation; RANAS: Risks, Attitudes, Norms, Abilities, Self-regulation; SHEWA-B: Sanitation, Hygiene education and water supply in Bangladesh; Programme SWASH: School, Water, Sanitation and Hygiene.
Icons adapted from: http://www.watersanitationhygiene.org/

 Hygiene (handwashing)

 Sanitation

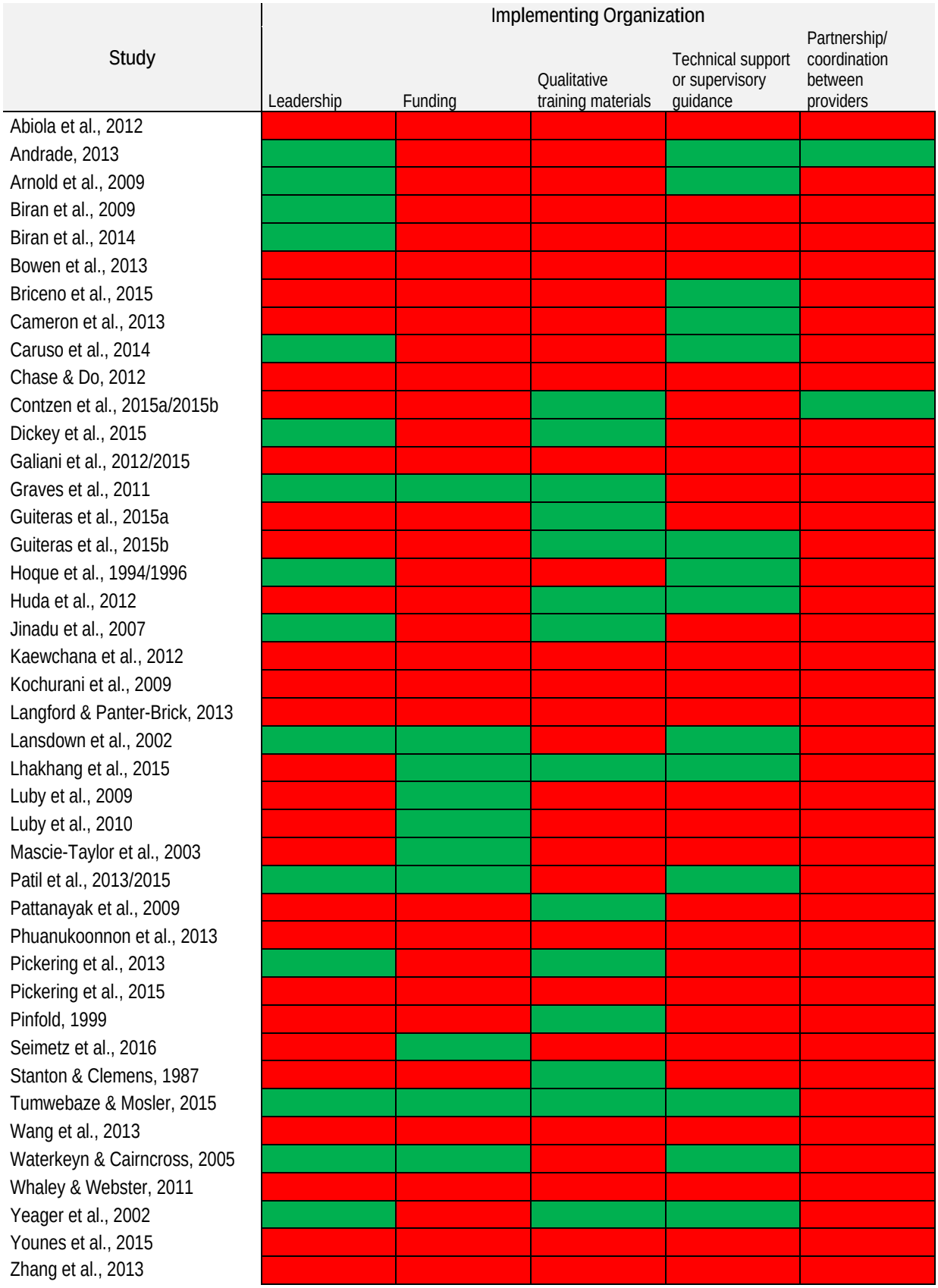
 Water supply/water quality

Figure 7: Reported information about the implementers



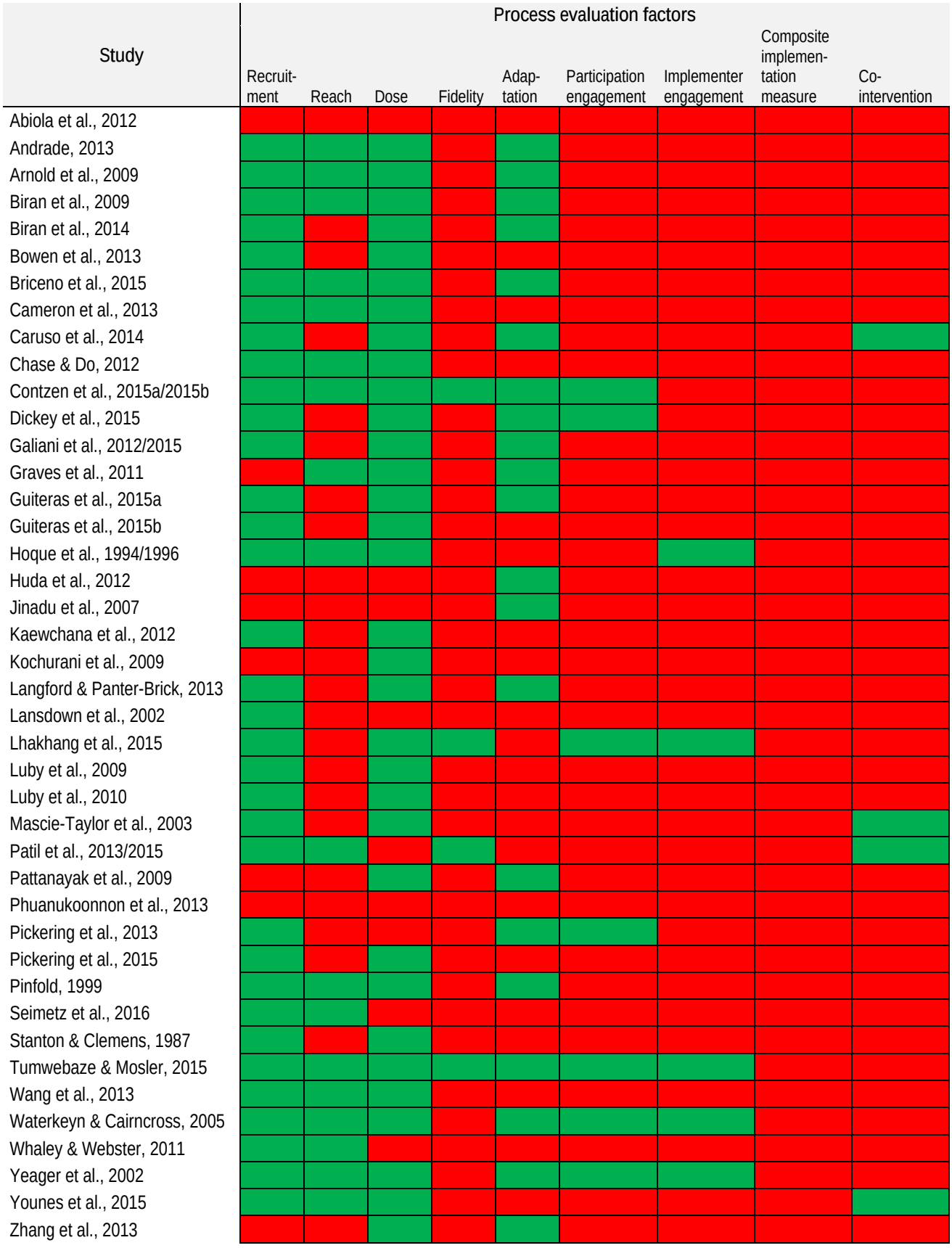
green: information available; red: information not available

Figure 8: Reported information about the implementing organization



green: information available; red: information not available

Figure 9: Reported information about the process evaluation factors



green: information available; red: information not available

Figure 13. Main categories of promotional approaches with detailed indication of WASH component and specific promotional approach for each included qualitative study.

Community-based approach (18 studies)	Social marketing approach (2 studies)	Sanitation and hygiene messaging (5 studies)	Elements of psychosocial theory (3 studies)
Adeyeye (2011) CLTS programme 	Cole et al. (2015) SPA Programma 	Graves et al. (2013) NICHE project (school level) 	Hulland et al. (2013) Designing a handwashing station for infrastructure-restricted communities 
Akter (2014) BRAC WASH 	Emerging Markets Consulting (2014) CR-SHIP 	Lansdown et al. (2002) The Lushoto Enhanced Health Education Project (school level) 	Langford et al. (2013) Handwashing programme intervention 
Andrade (2013) Community-based hygiene promotion intervention 		O'Donnell (2015) A mobile phone based health promotion project 	Rajaraman et al. (2014) SuperAmma programme 
Brooks et al. (2015) CHC's 		Xuan et al. (2013) HWWS intervention (school level) 	

Bruck and Dinku (2008)
MWP programme

Hueso and Bell (2013)
Total Sanitation Campaign

Jimenez et al. (2014)
National Sanitation Campaign

Katsi (2008)
Community-based management programme for water supply and

Kiwanuka et al. (2015)
The RUWASA project

Yeager et al. (2002)
CRED programme

Lawrence et al. (2016)
Hygiene and sanitation scaling-up project, via CLTS

Malebo et al. (2012)
The MTUMBA sanitation approach (containing CLTS, PHAST and PRA)

Pardeshi (2009)
Total Sanitation Campaign

Rheinlander et al. (2012)
The SANIVAT project

Sarker and Panday (2007)
The WPP project

Schouten and Mathenge (2010)
Communal sanitation programme

Silali et al. (2014)
Water and sanitation programmes

Smith et al. (2004)
Health promotion and disease prevention programme

Whaley & Webster (2011)
CHCs and CLTS

BRAC: Bangladesh Rural Advancement Committee; CHC: Community Health Clubs; CLTS: Community-led total sanitation; CR-SHIP: Cambodia Rural Sanitation and Hygiene Improvement Program; HWWS: Handwashing with soap; MWP: Millennium Water Program; PHAST: Participatory Hygiene and Sanitation Transformation; PRA: Participatory Rural Appraisal; RUWASA: The Rural Water and Sanitation project; SANIVAT: Water supply, sanitation, hygiene promotion and health in Vietnam; SPA: Saniation in Peri-Uban Areas; WPP: The Water and Sanitation Partnership Project

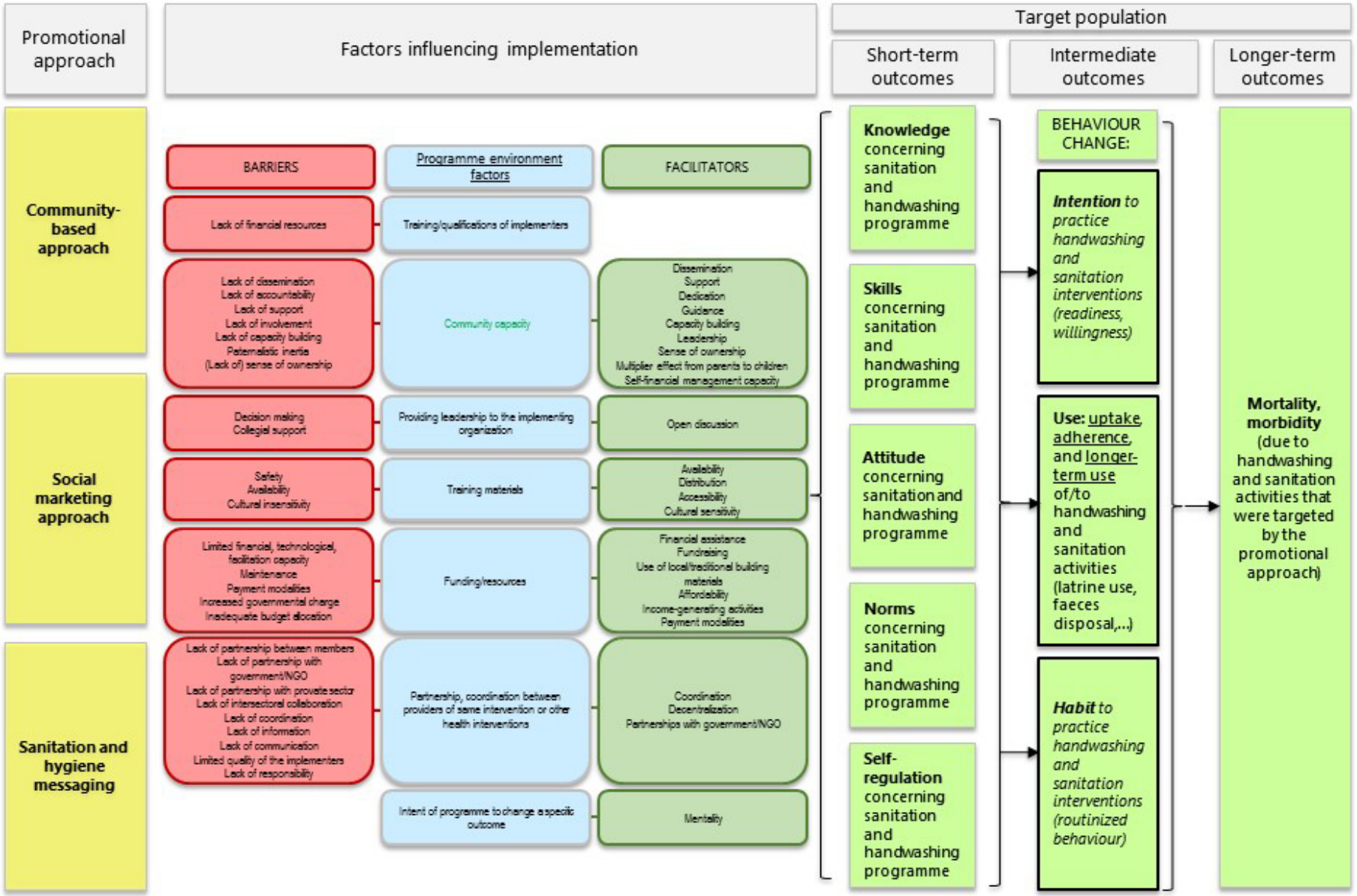
Icons adapted from: http://www.watersanitationhygiene.org/

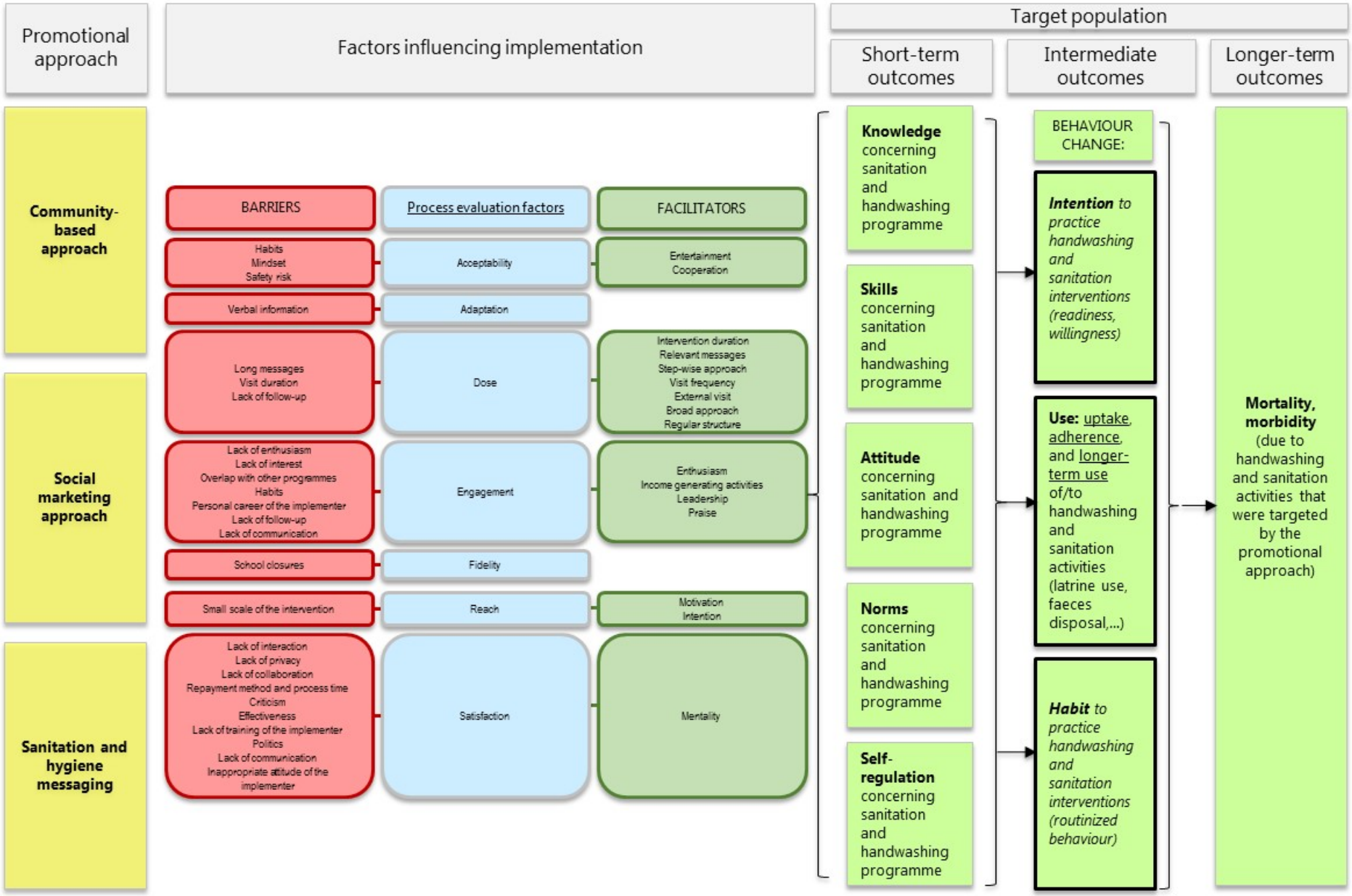
 Hygiene (handwashing)

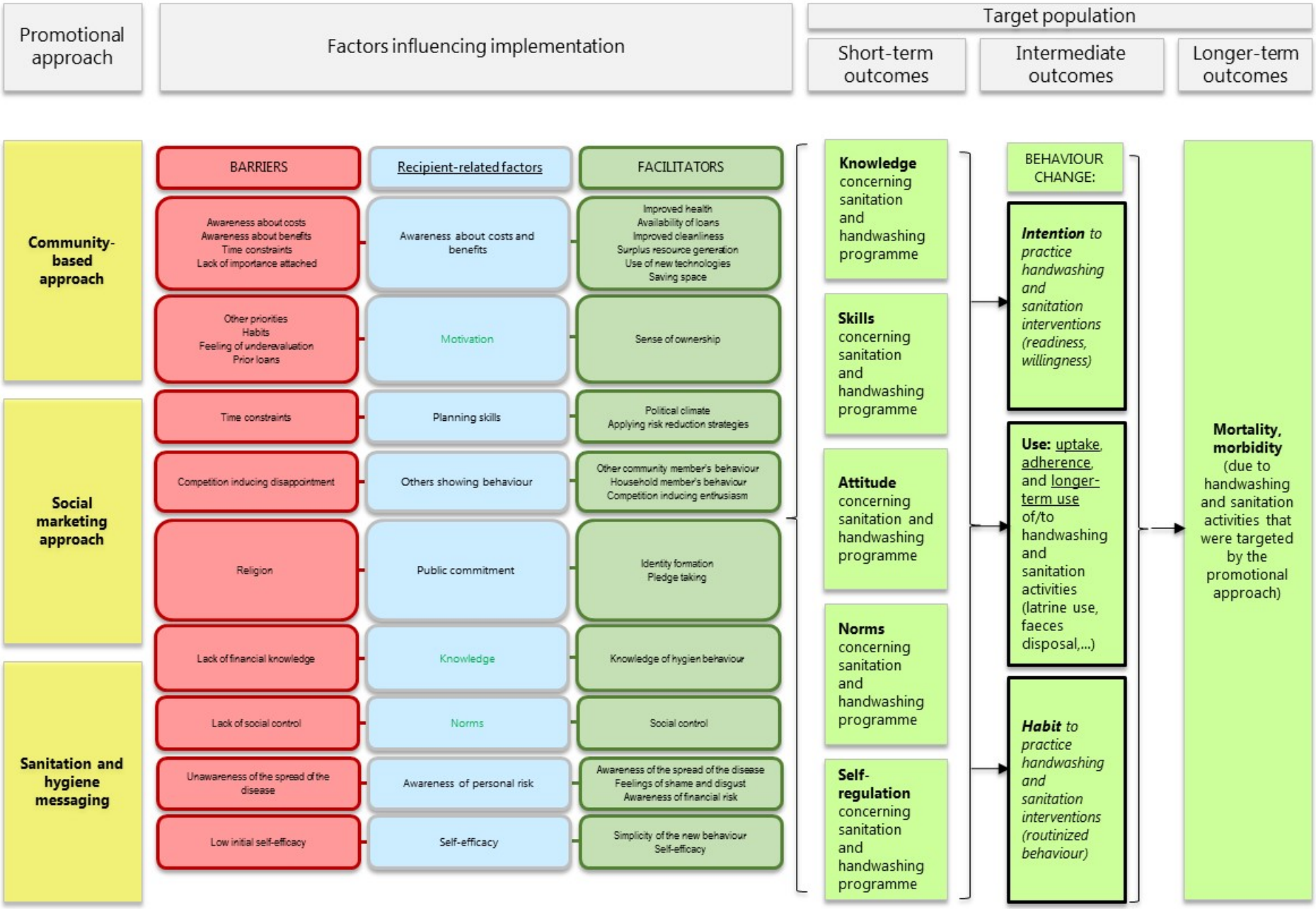
 Sanitation

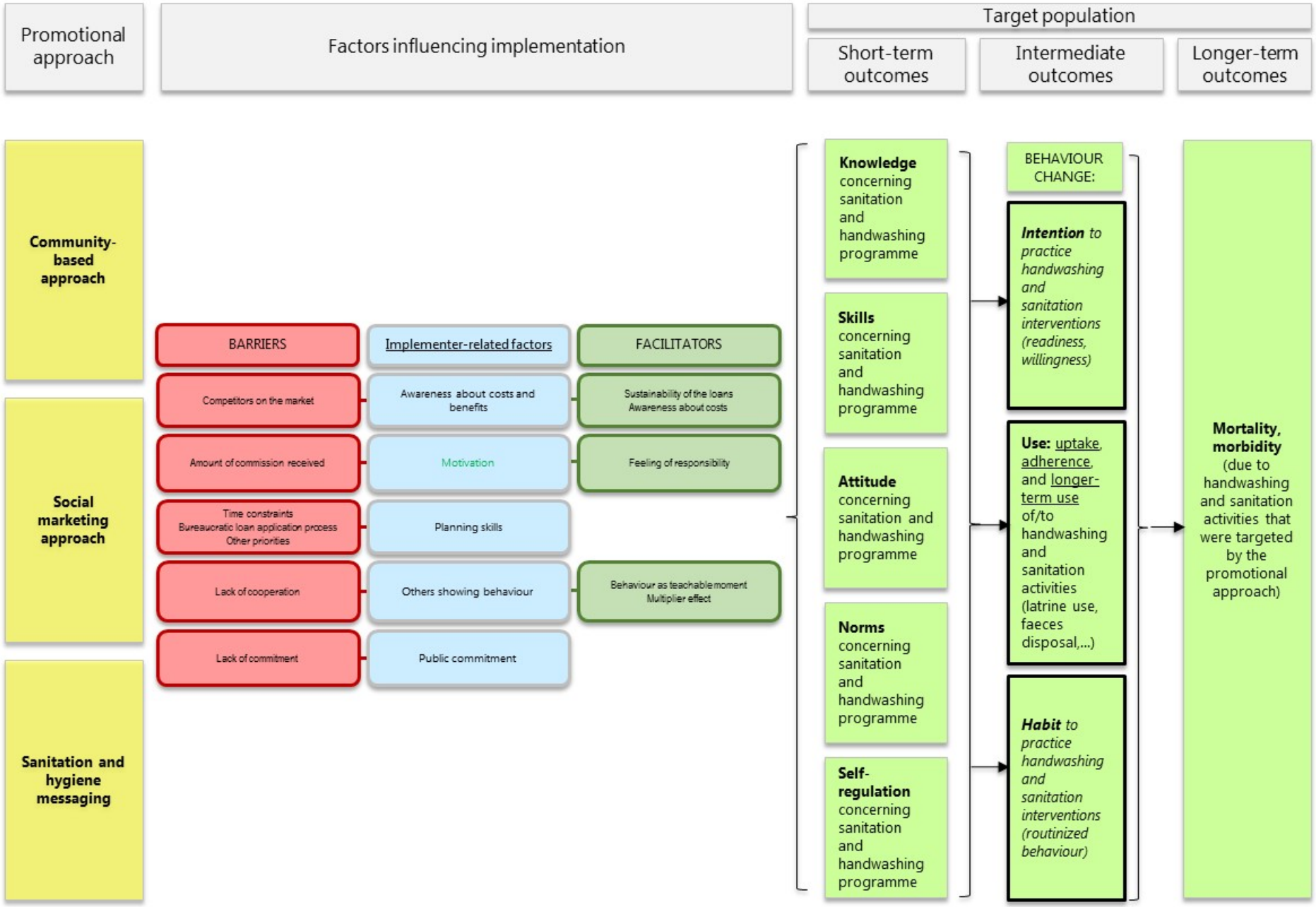
 Water supply/water quality

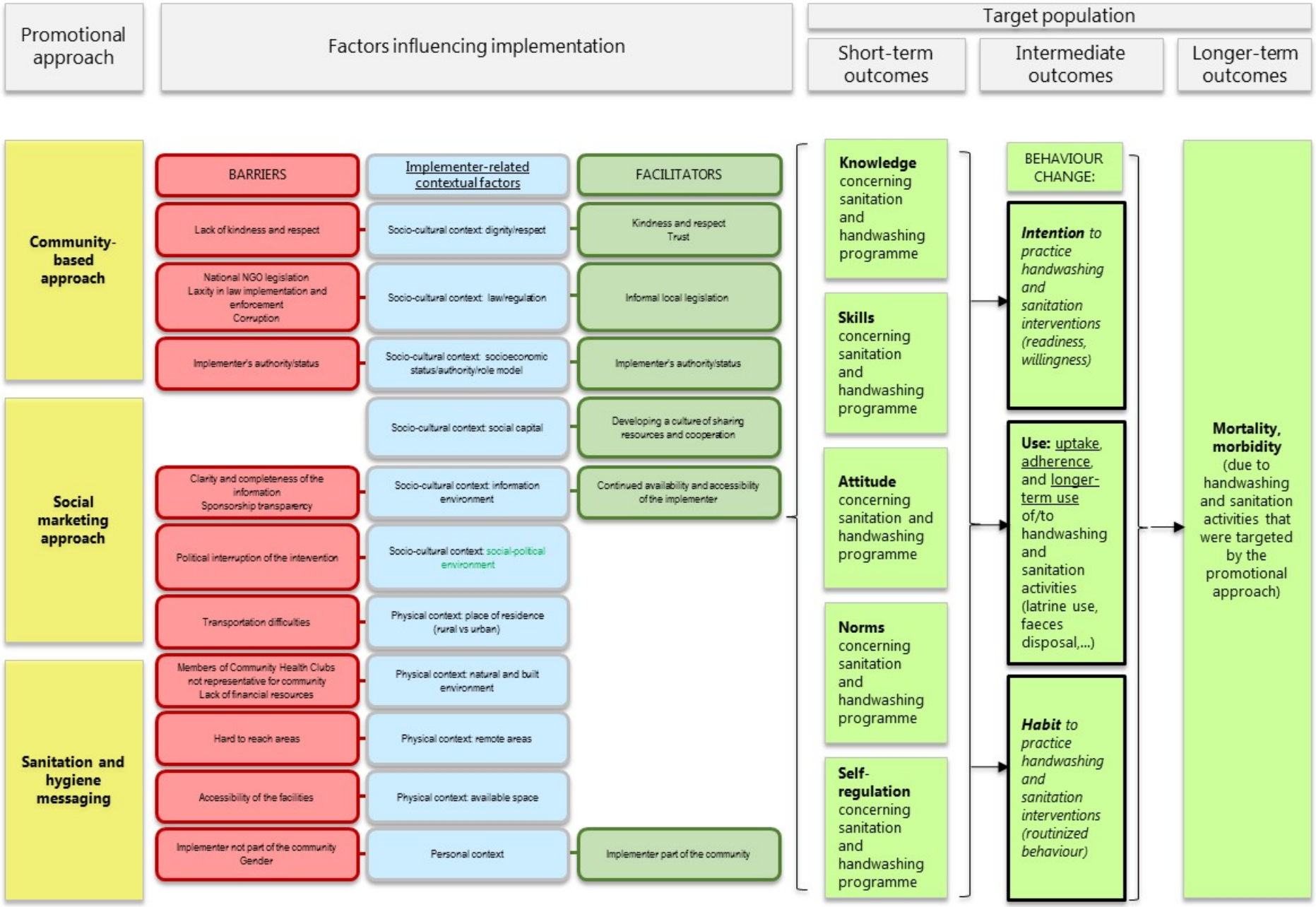
Figure 16. Integrated synthesis: detailed results from qualitative findings coupled back to ToC

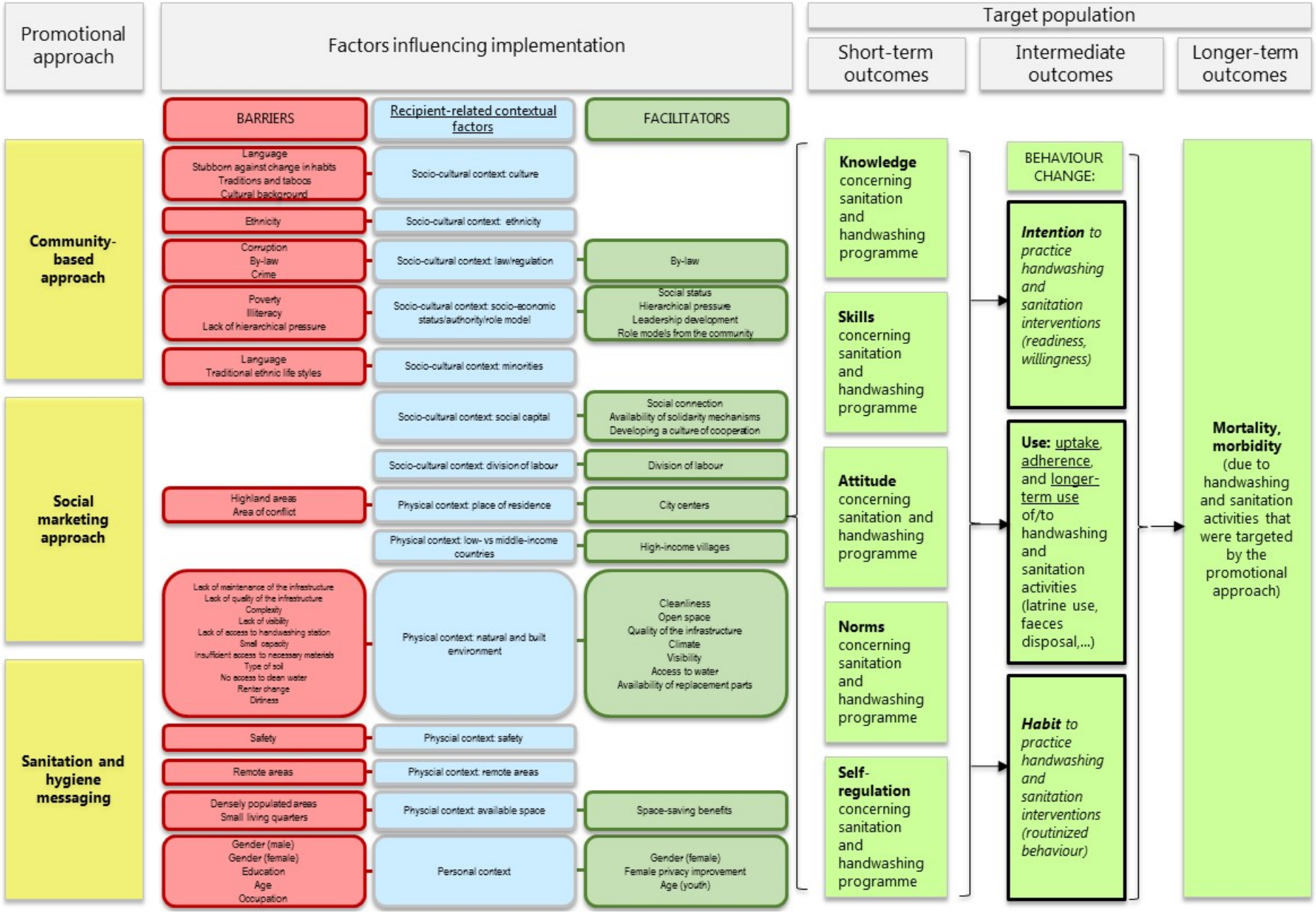



Promotional approach
Factors influencing implementation
Target population
Short-term outcomes
Intermediate outcomes
Longer-term outcomes
Community-based approach
Social marketing approach
Sanitation and hygiene messaging
BARRIERS
Process evaluation factors
FACILITATORS
Habits
Mindset
Safety risk
Acceptability
Entertainment
Cooperation
Verbal information
Adaptation
Long messages
Visit duration
Lack of follow-up
Dose
Intervention duration
Relevant messages
Step-wise approach
Visit frequency
External visit
Broad approach
Regular structure
Lack of enthusiasm
Lack of interest
Overlap with other programmes
Habits
Personal career of the implementer
Lack of follow-up
Lack of communication
Engagement
Enthusiasm
Income generating activities
Leadership
Praise
School closures
Fidelity
Small scale of the intervention
Reach
Motivation
Intention
Lack of interaction
Lack of privacy
Lack of collaboration
Repayment method and process time
Criticism
Effectiveness
Lack of training of the implementer
Politics
Lack of communication
Inappropriate attitude of the implementer
Satisfaction
Mentality
Knowledge concerning sanitation and handwashing programme
Skills concerning sanitation and handwashing programme
Attitude concerning sanitation and handwashing programme
Norms concerning sanitation and handwashing programme
Self-regulation concerning sanitation and handwashing programme
BEHAVIOUR CHANGE:
Intention to practice handwashing and sanitation interventions (readiness, willingness)
Use: uptake, adherence, and longer-term use of/to handwashing and sanitation activities (latrine use, faeces disposal,...)
Habit to practice handwashing and sanitation interventions (routinized behaviour)
Mortality, morbidity (due to handwashing and sanitation activities that were targeted by the promotional approach)


Promotional approach
Factors influencing implementation
Target population
Short-term outcomes
Intermediate outcomes
Longer-term outcomes
Community-based approach
Social marketing approach
Sanitation and hygiene messaging
BARRIERS
Recipient-related factors
FACILITATORS
Awareness about costs
Awareness about benefits
Time constraints
Lack of importance attached
Awareness about costs and benefits
Improved health
Availability of loans
Improved cleanliness
Surplus resource generation
Use of new technologies
Saving space
Other priorities
Habits
Feeling of undervaluation
Prior loans
Motivation
Sense of ownership
Time constraints
Planning skills
Political climate
Applying risk reduction strategies
Competition inducing disappointment
Others showing behaviour
Other community member's behaviour
Household member's behaviour
Competition inducing enthusiasm
Religion
Public commitment
Identity formation
Pledge taking
Lack of financial knowledge
Knowledge
Knowledge of hygien behaviour
Lack of social control
Norms
Social control
Unawareness of the spread of the disease
Awareness of personal risk
Awareness of the spread of the disease
Feelings of shame and disgust
Awareness of financial risk
Low initial self-efficacy
Self-efficacy
Simplicity of the new behaviour
Self-efficacy
Knowledge concerning sanitation and handwashing programme
Skills concerning sanitation and handwashing programme
Attitude concerning sanitation and handwashing programme
Norms concerning sanitation and handwashing programme
Self-regulation concerning sanitation and handwashing programme
BEHAVIOUR CHANGE:
Intention to practice handwashing and sanitation interventions (readiness, willingness)
Use: uptake, adherence, and longer-term use of/to handwashing and sanitation activities (latrine use, faeces disposal,...)
Habit to practice handwashing and sanitation interventions (routinized behaviour)
Mortality, morbidity (due to handwashing and sanitation activities that were targeted by the promotional approach)


Promotional approach
Factors influencing implementation
Target population
Short-term outcomes
Intermediate outcomes
Longer-term outcomes
Community-based approach
Social marketing approach
Sanitation and hygiene messaging
BARRIERS
Implementer-related factors
FACILITATORS
Competitors on the market
Awareness about costs and benefits
Sustainability of the loans
Awareness about costs
Amount of commission received
Motivation
Feeling of responsibility
Time constraints
Bureaucratic loan application process
Other priorities
Planning skills
Lack of cooperation
Others showing behaviour
Behaviour as teachable moment
Multiplier effect
Lack of commitment
Public commitment
Knowledge concerning sanitation and handwashing programme
Skills concerning sanitation and handwashing programme
Attitude concerning sanitation and handwashing programme
Norms concerning sanitation and handwashing programme
Self-regulation concerning sanitation and handwashing programme
BEHAVIOUR CHANGE:
Intention to practice handwashing and sanitation interventions (readiness, willingness)
Use: uptake, adherence, and longer-term use of/to handwashing and sanitation activities (latrine use, faeces disposal,...)
Habit to practice handwashing and sanitation interventions (routinized behaviour)
Mortality, morbidity (due to handwashing and sanitation activities that were targeted by the promotional approach)

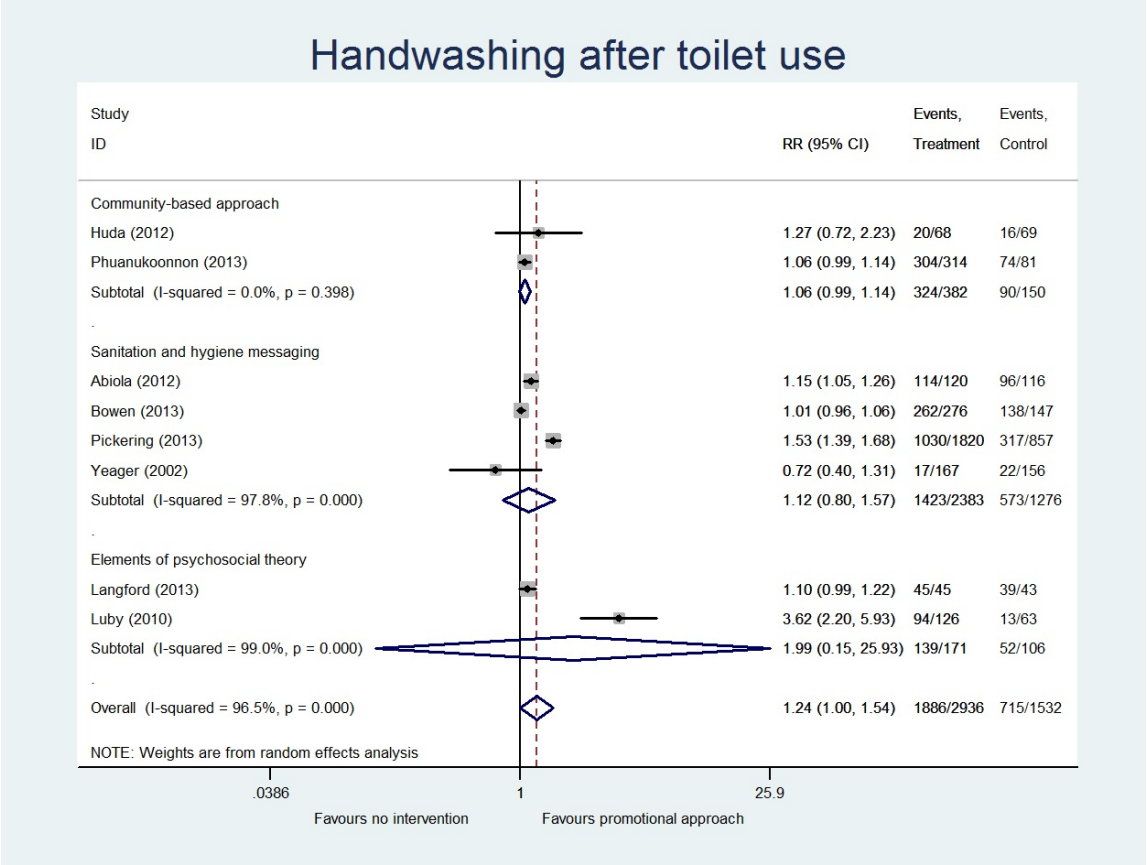

Promotional approach
Factors influencing implementation
Target population
Short-term outcomes
Intermediate outcomes
Longer-term outcomes
Community-based approach
Social marketing approach
Sanitation and hygiene messaging
BARRIERS
Implementer-related contextual factors
FACILITATORS
Lack of kindness and respect
Socio-cultural context: dignity/respect
Kindness and respect
Trust
National NGO legislation
Laxity in law implementation and enforcement
Corruption
Socio-cultural context: law/regulation
Informal local legislation
Implementer's authority/status
Socio-cultural context: socioeconomic status/authority/role model
Implementer's authority/status
Socio-cultural context: social capital
Developing a culture of sharing resources and cooperation
Clarity and completeness of the information
Sponsorship transparency
Socio-cultural context: information environment
Continued availability and accessibility of the implementer
Political interruption of the intervention
Socio-cultural context: social-political environment
Transportation difficulties
Physical context: place of residence (rural vs urban)
Members of Community Health Clubs not representative for community
Lack of financial resources
Physical context: natural and built environment
Hard to reach areas
Physical context: remote areas
Accessibility of the facilities
Physical context: available space
Implementer not part of the community
Gender
Personal context
Implementer part of the community
Knowledge concerning sanitation and handwashing programme
Skills concerning sanitation and handwashing programme
Attitude concerning sanitation and handwashing programme
Norms concerning sanitation and handwashing programme
Self-regulation concerning sanitation and handwashing programme
BEHAVIOUR CHANGE:
Intention to practice handwashing and sanitation interventions (readiness, willingness)
Use: uptake, adherence, and longer-term use of/to handwashing and sanitation activities (latrine use, faeces disposal,...)
Habit to practice handwashing and sanitation interventions (routinized behaviour)
Mortality, morbidity (due to handwashing and sanitation activities that were targeted by the promotional approach)



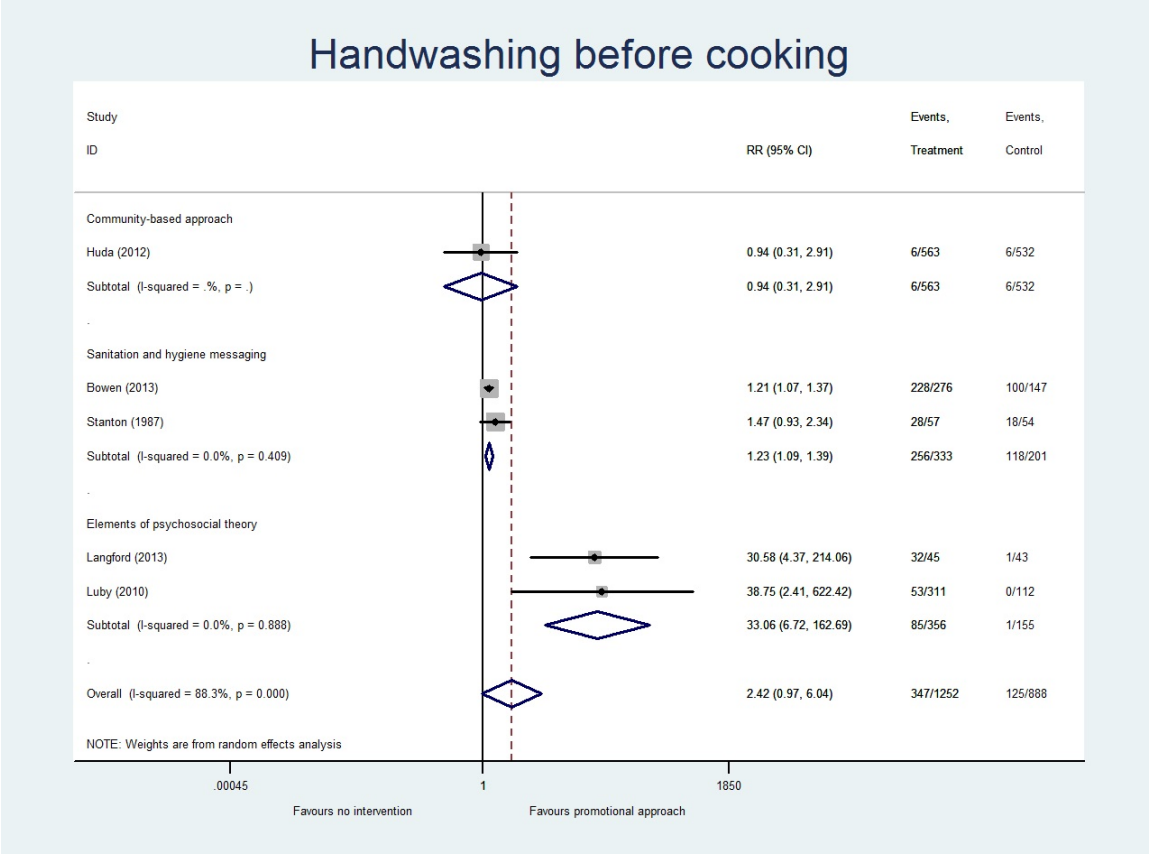
Legend: Green boxes contain short-term, intermediate or longer-term outcomes. Primary outcomes are indicated in boxes with a black border. Blue boxes contain factors that can influence the implementation of the promotional approaches. Factors indicated in green are newly identified compared to the original ToC. Items in italics are not supported with evidence from our systematic review.

12 Data and analyses

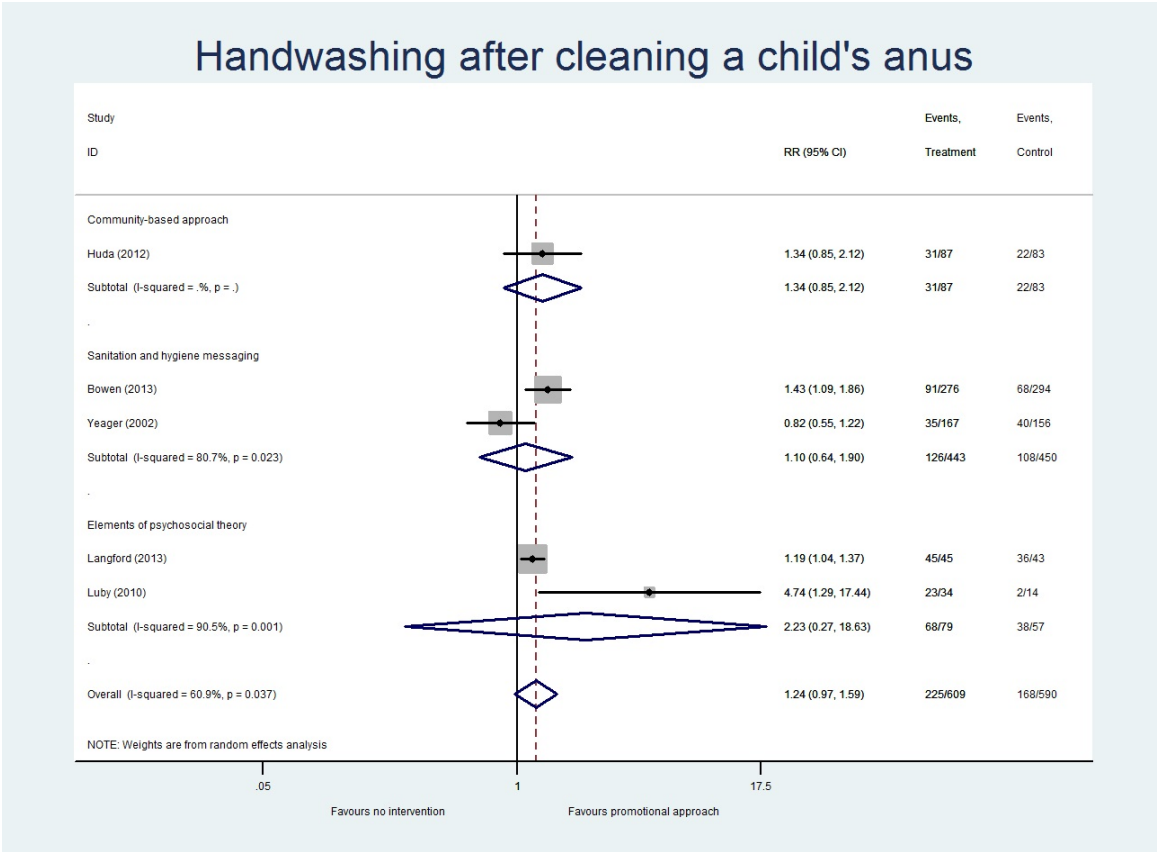
Analysis 1: Any promotional approach: Handwashing after toilet use



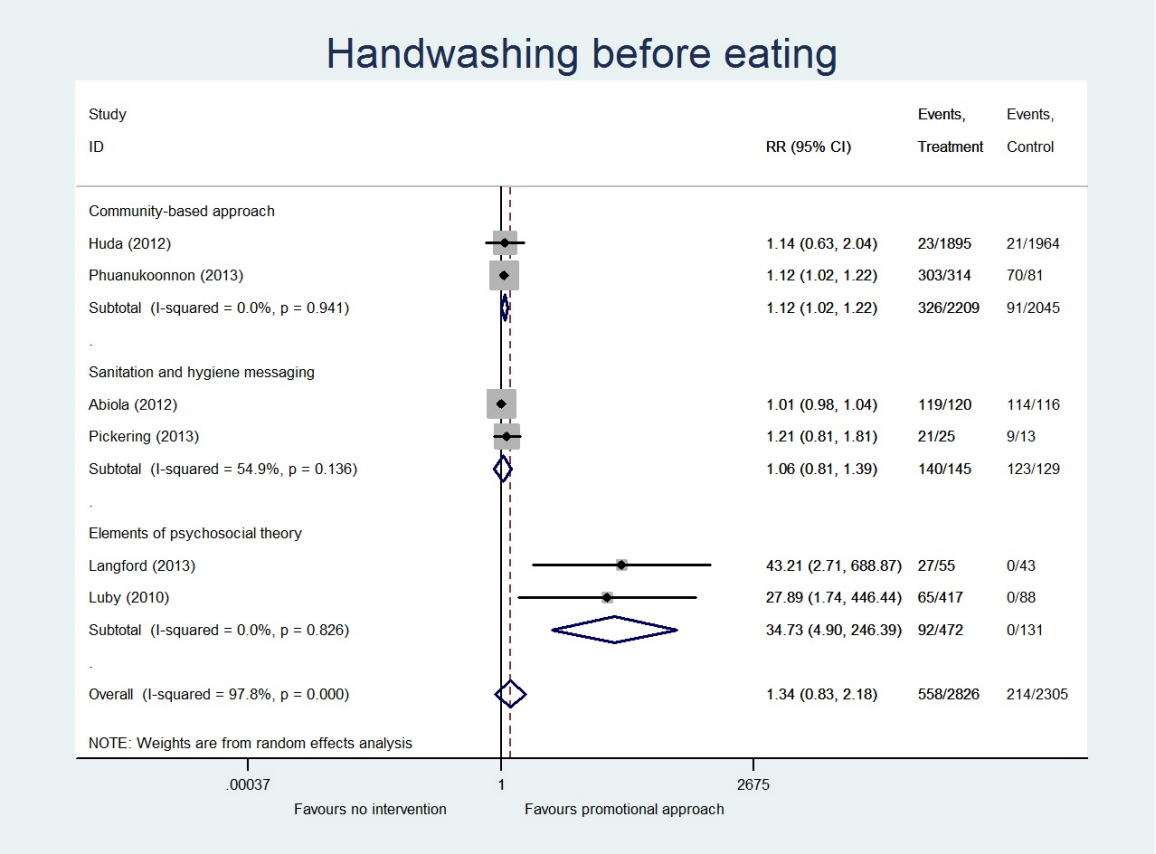
Analysis 2: Any promotional approach: Handwashing before cooking



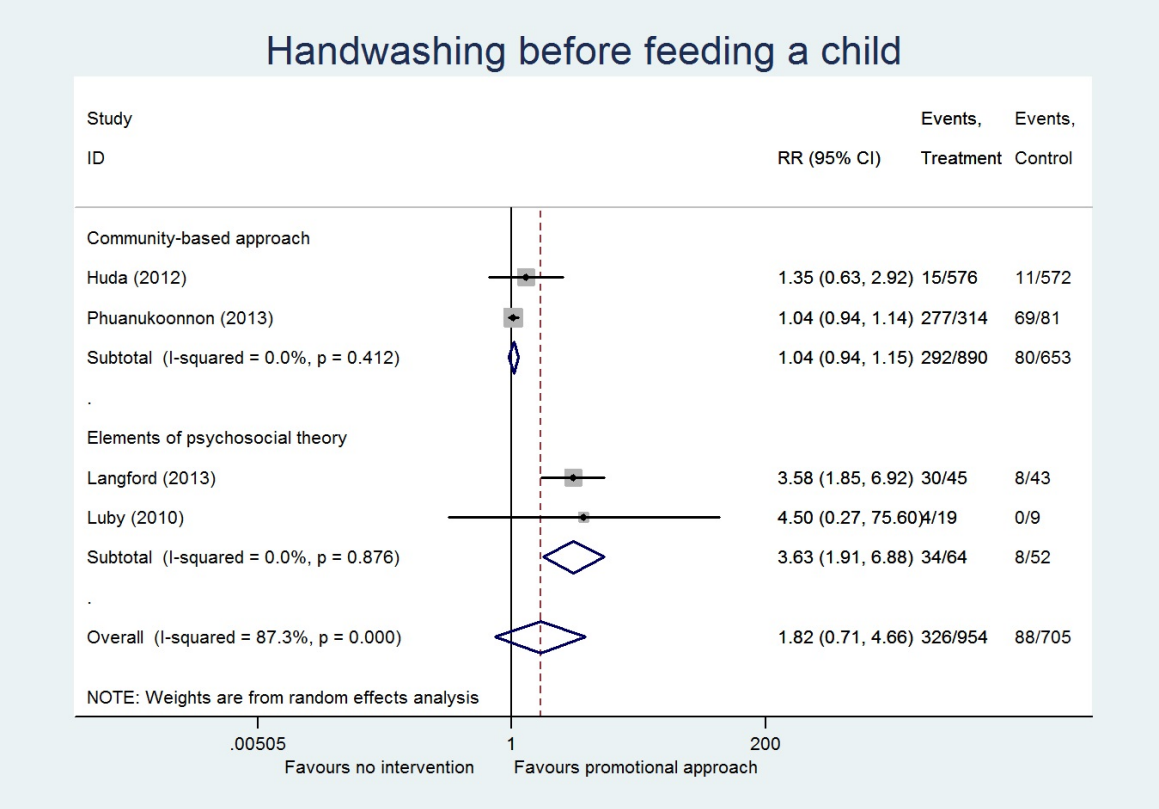
Analysis 3: Any promotional approach: Handwashing after cleaning a child's anus



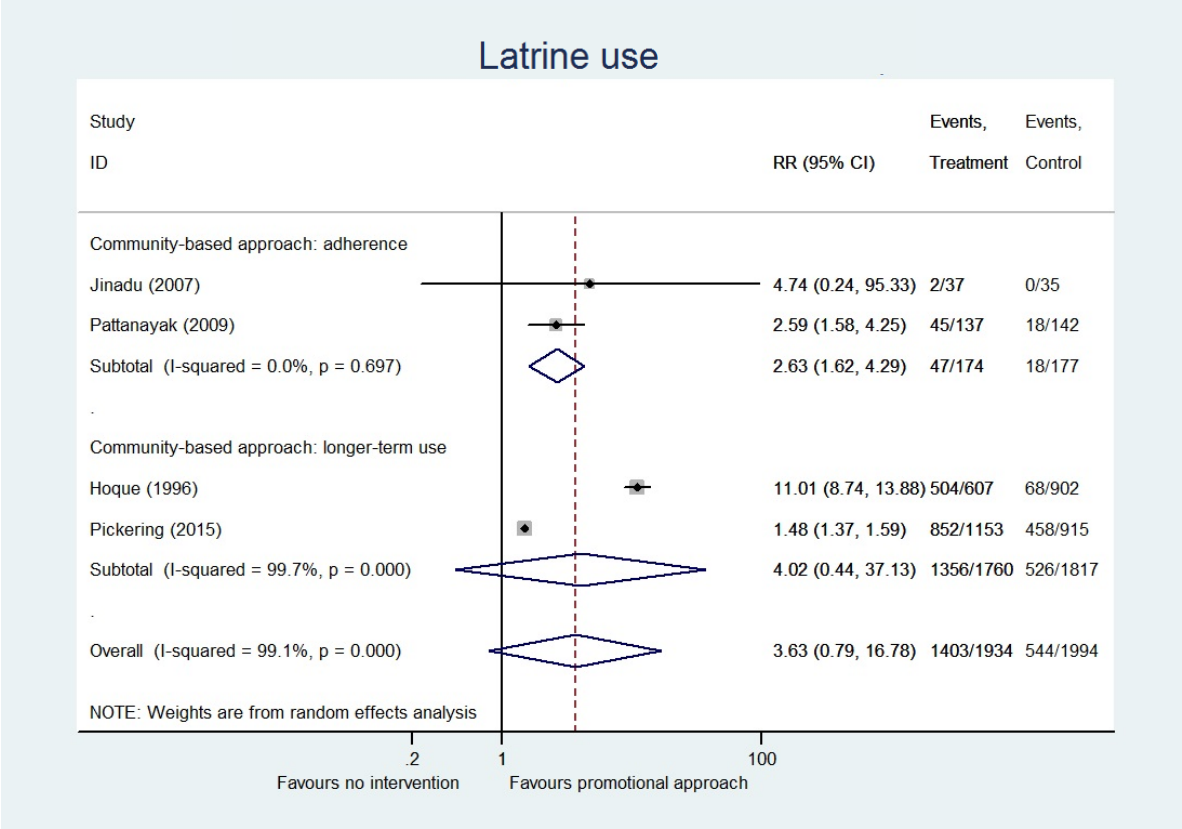
Analysis 4: Any promotional approach: Handwashing before eating



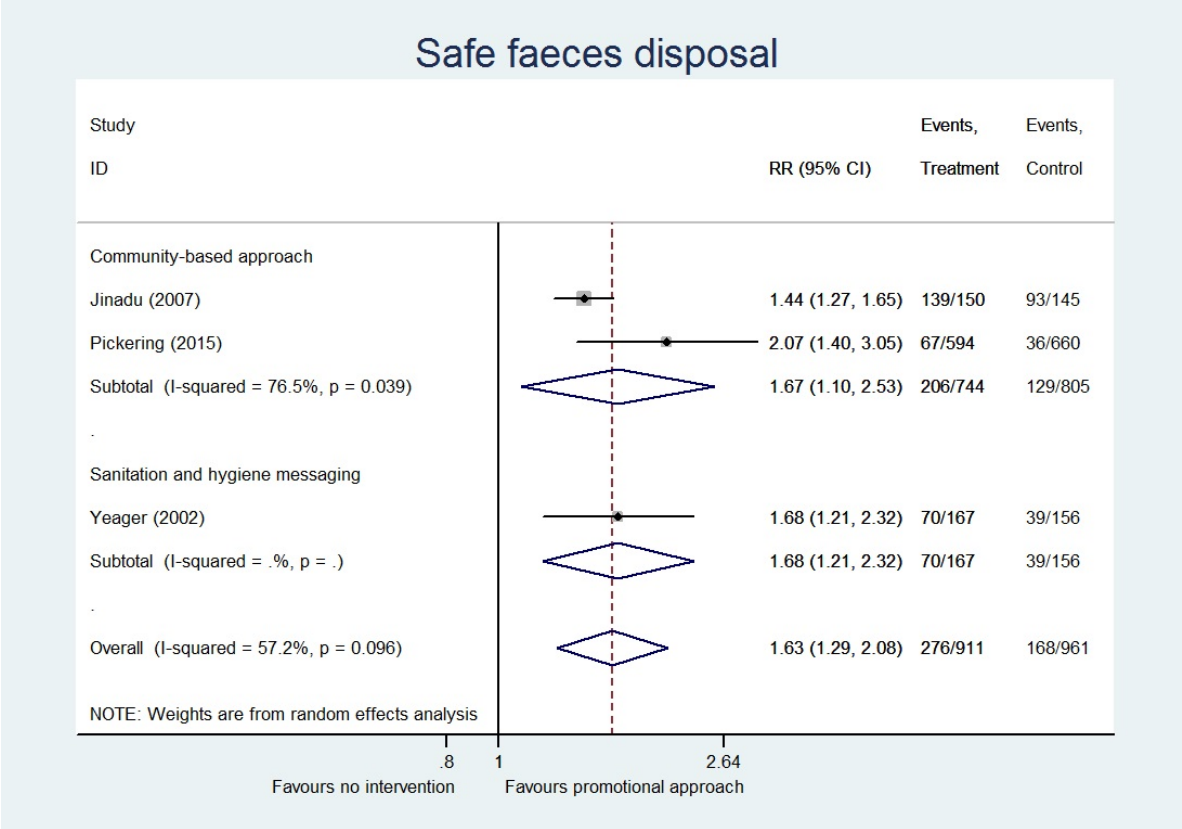
Analysis 5: Any promotional approach: Handwashing before feeding a child



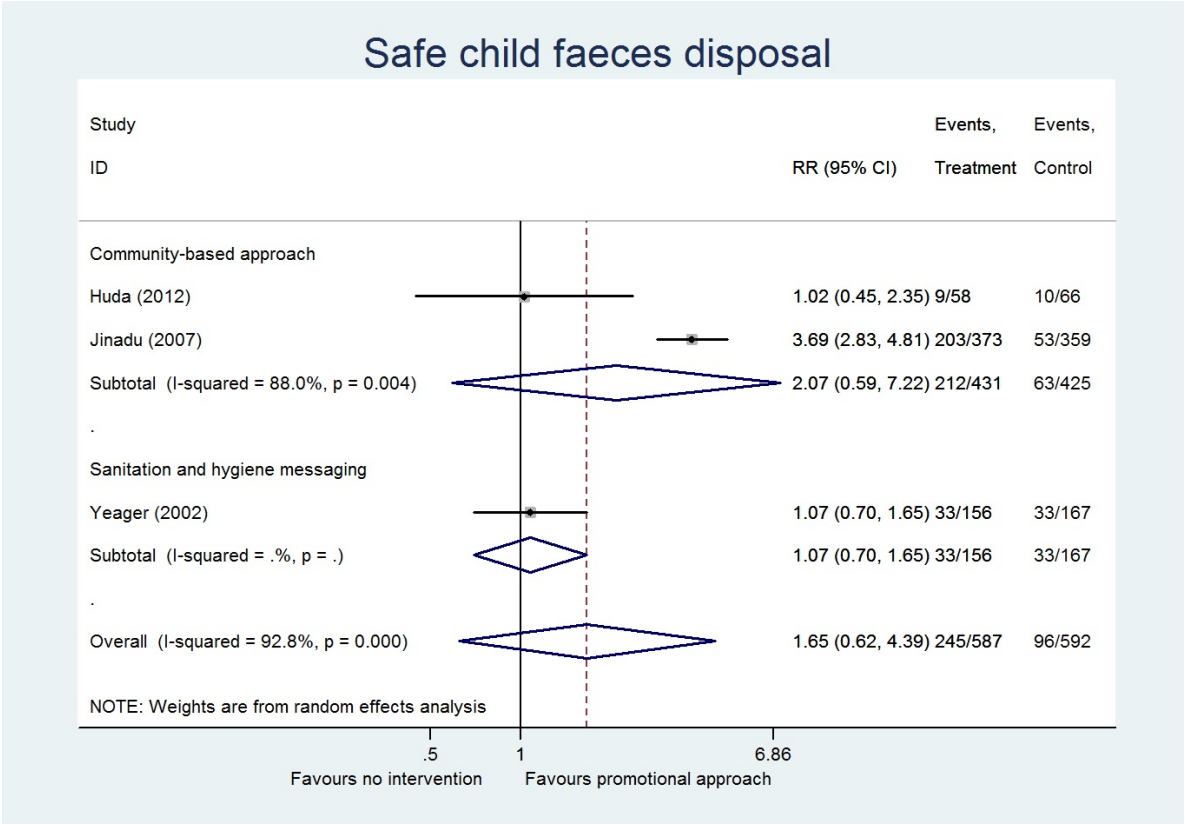
Analysis 6: Any promotional approach: Latrine use



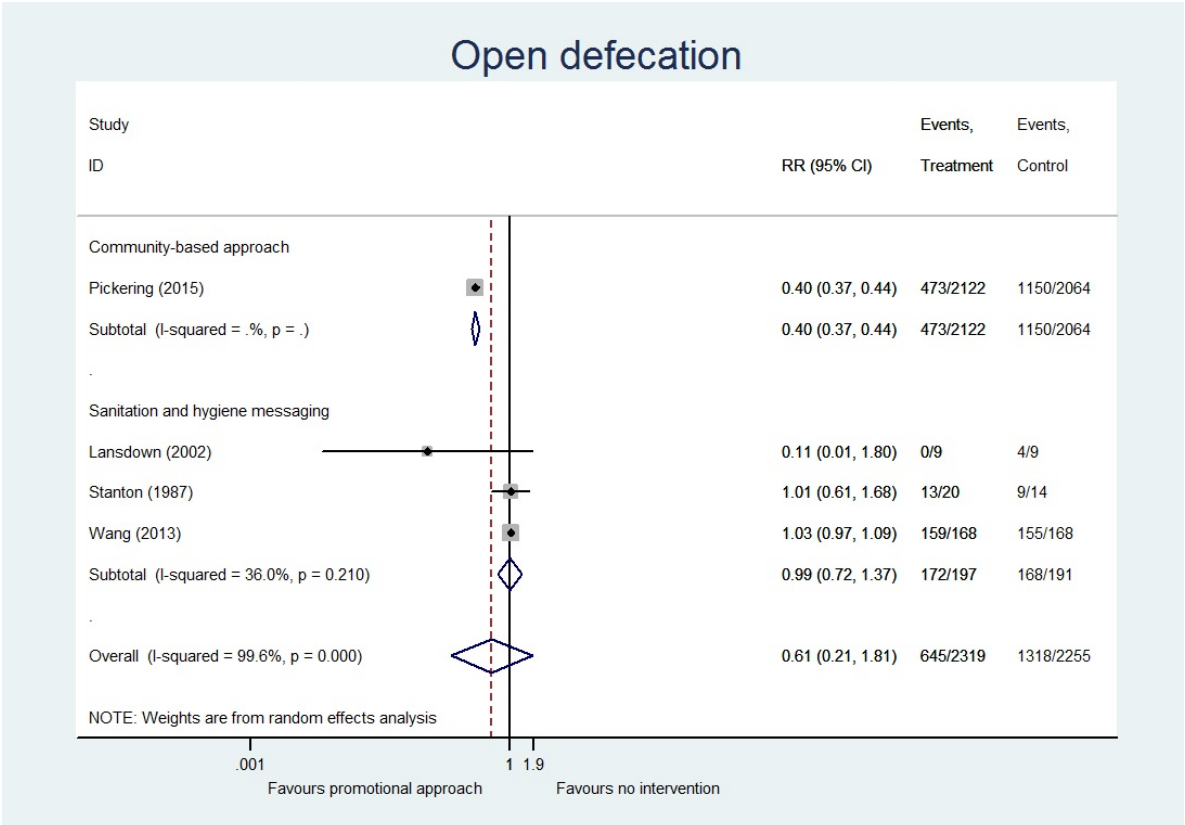
Analysis 7: Any promotional approach: Safe faeces disposal



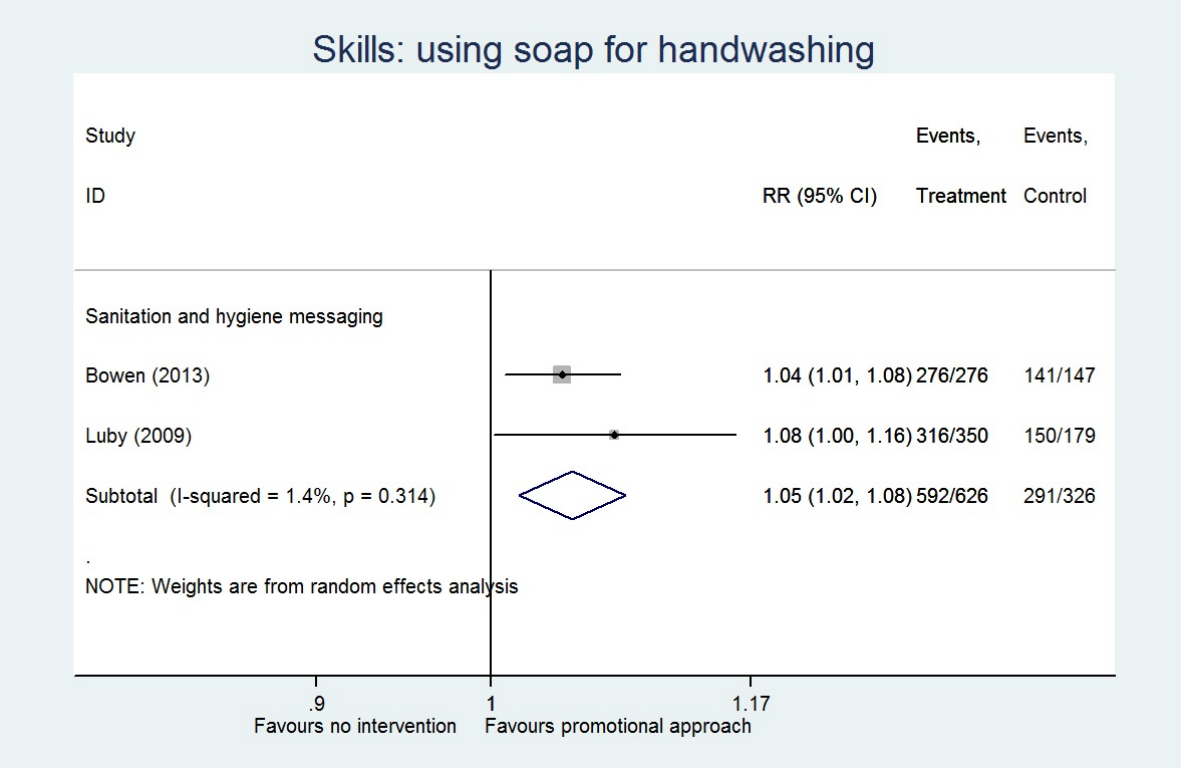
Analysis 8: Any promotional approach: Safe child faeces disposal



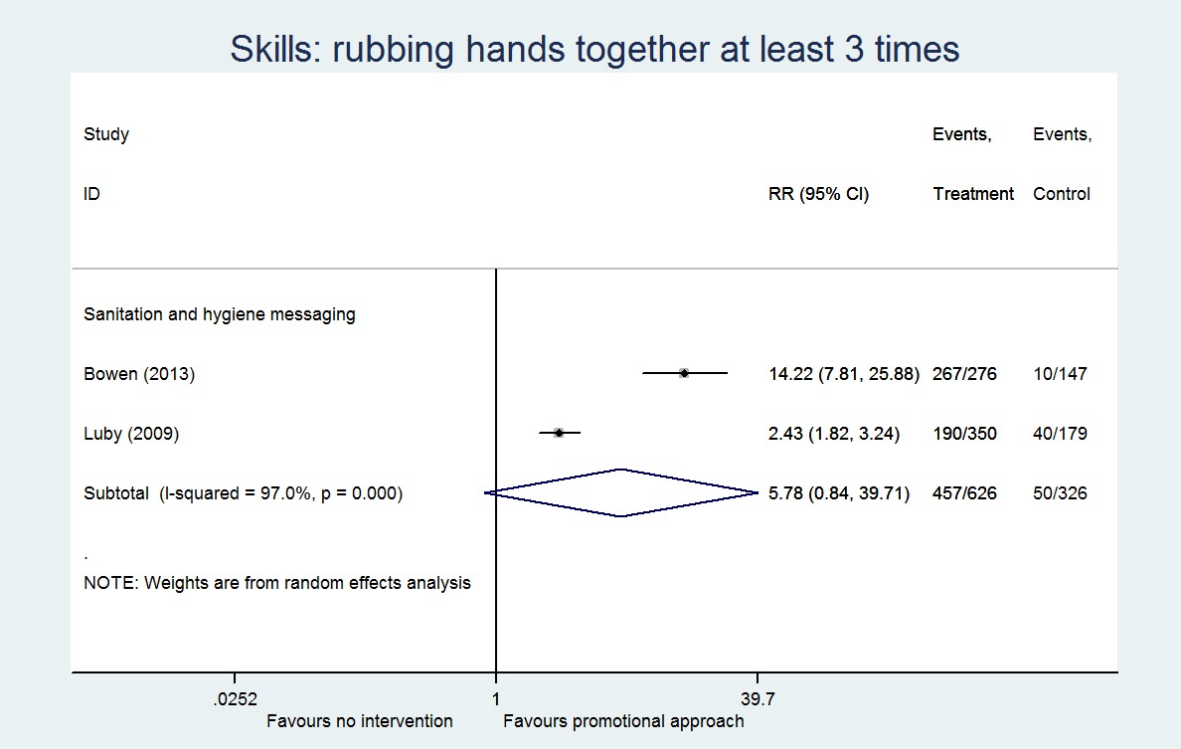
Analysis 9: Any promotional approach: Open defecation



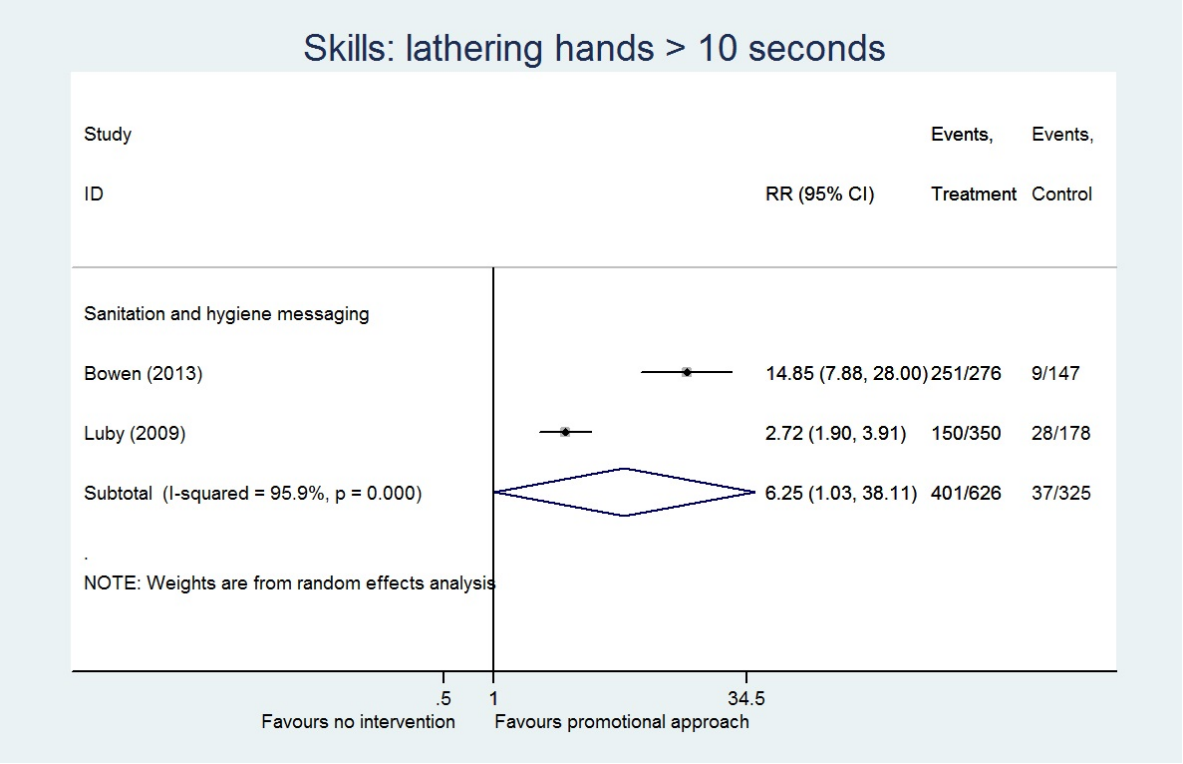
Analysis 10: Any promotional approach: Skills: using soap for handwashing



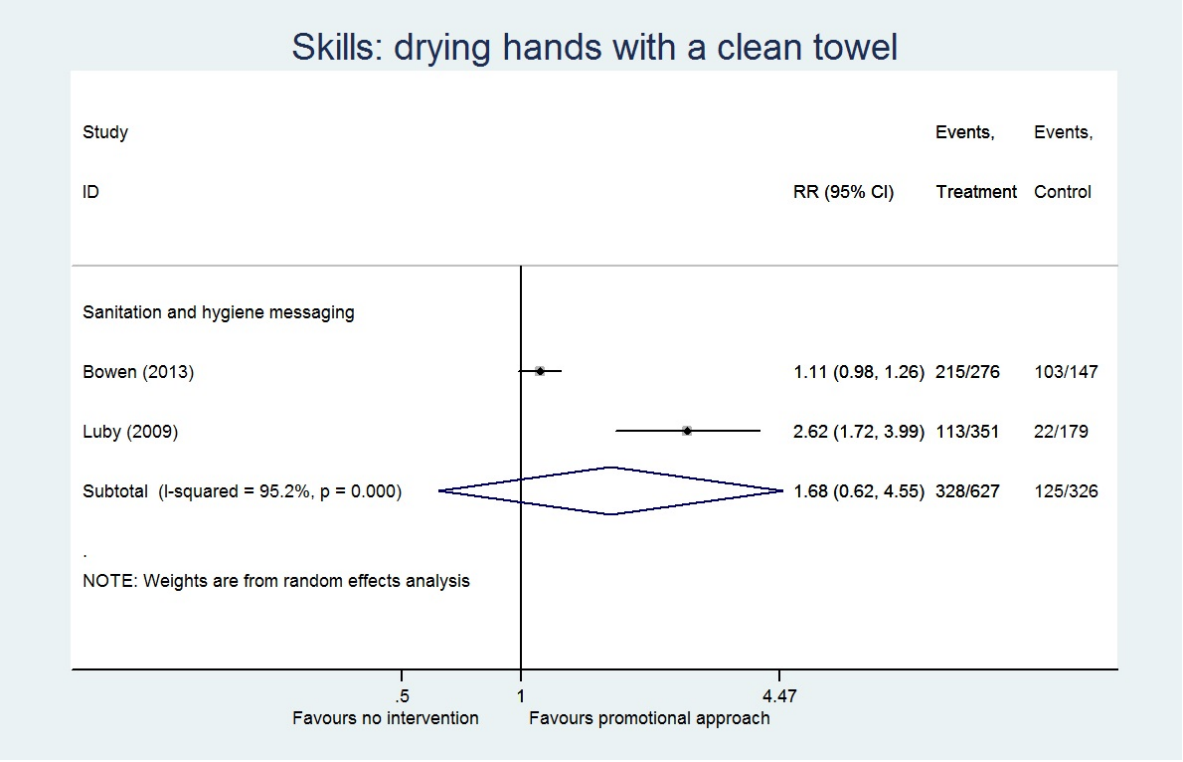
Analysis 11: Any promotional approach: Skills: rubbing hands together at least 3 times



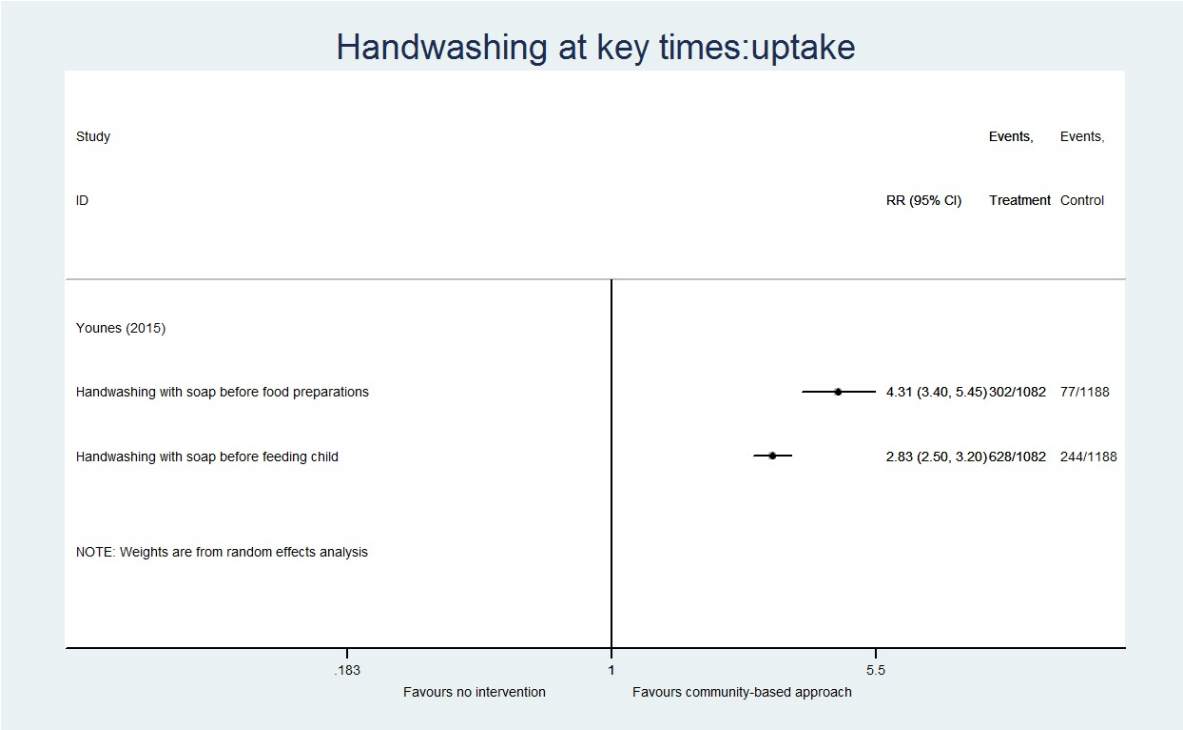
Analysis 12: Any promotional approach: Skills: lathering hands > 10 seconds

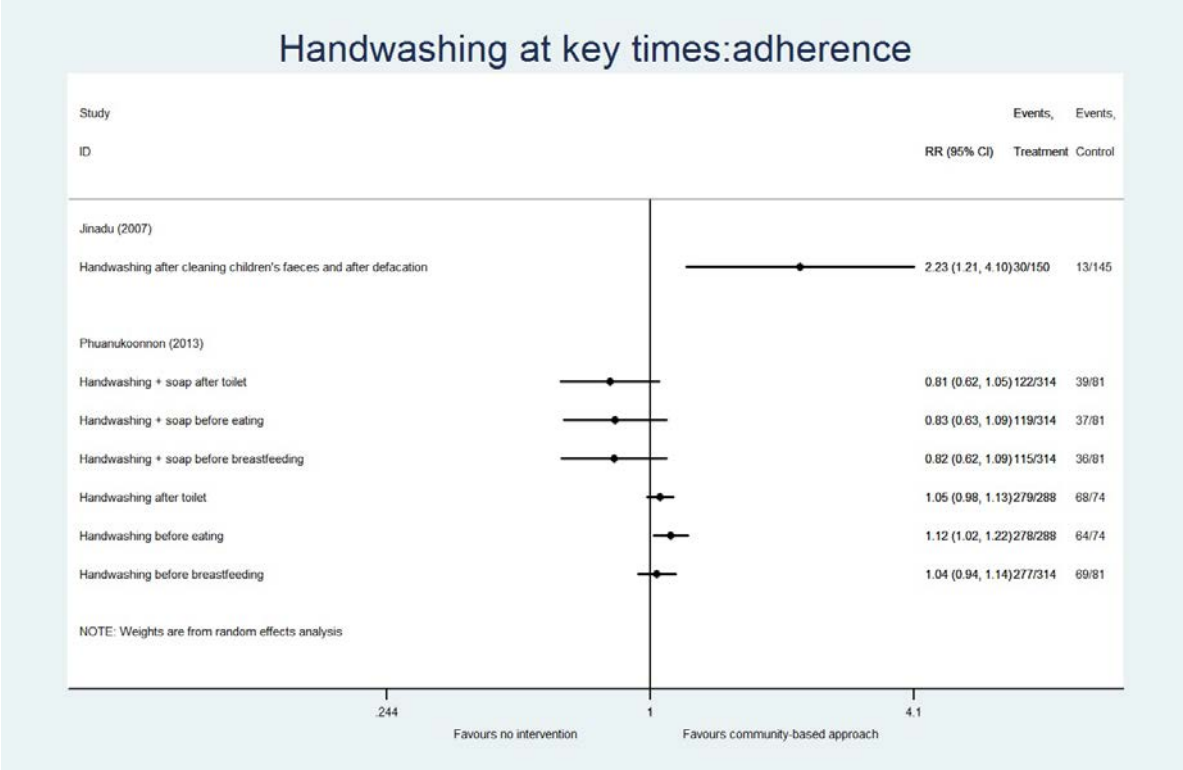


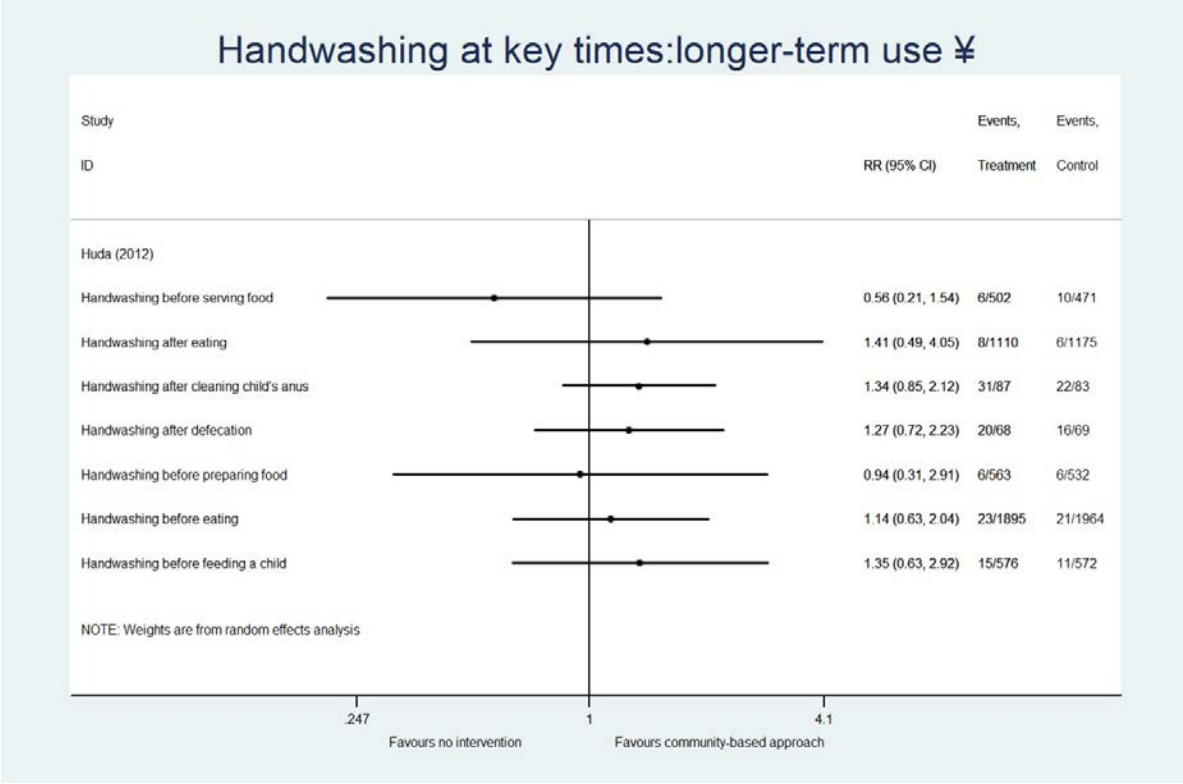
Analysis 13: Any promotional approach: Skills: drying hands with a clean towel

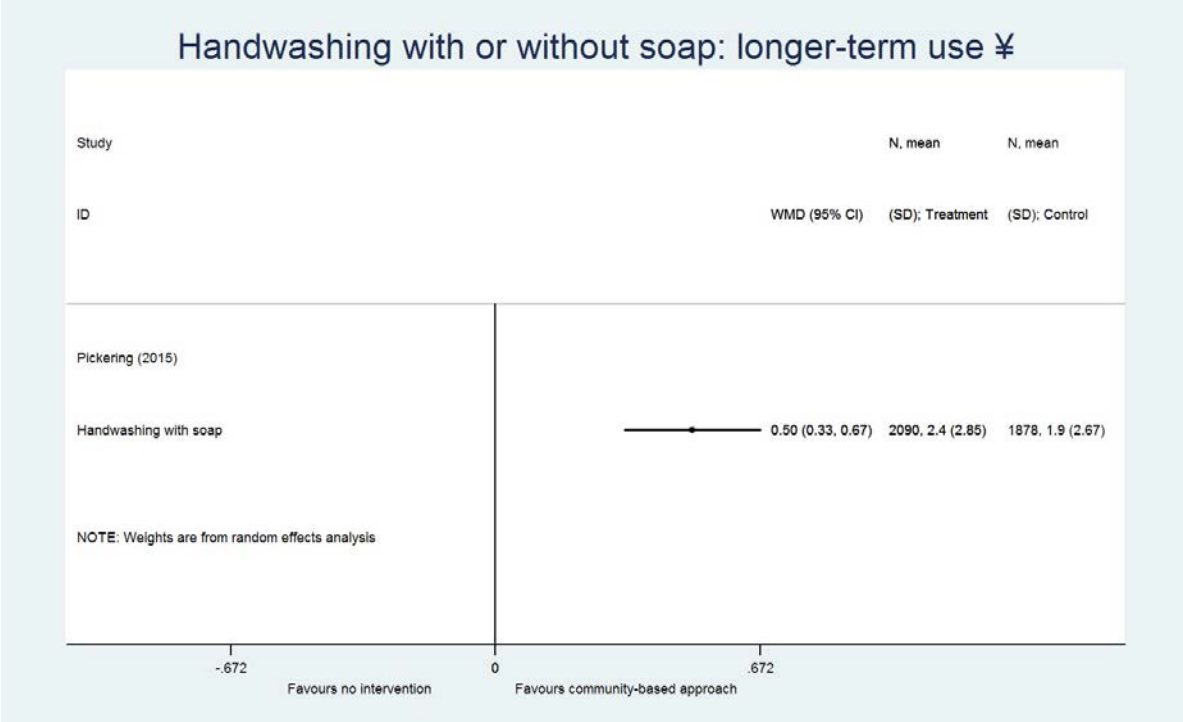


Analysis 14: Community-based approach: Handwashing at key times



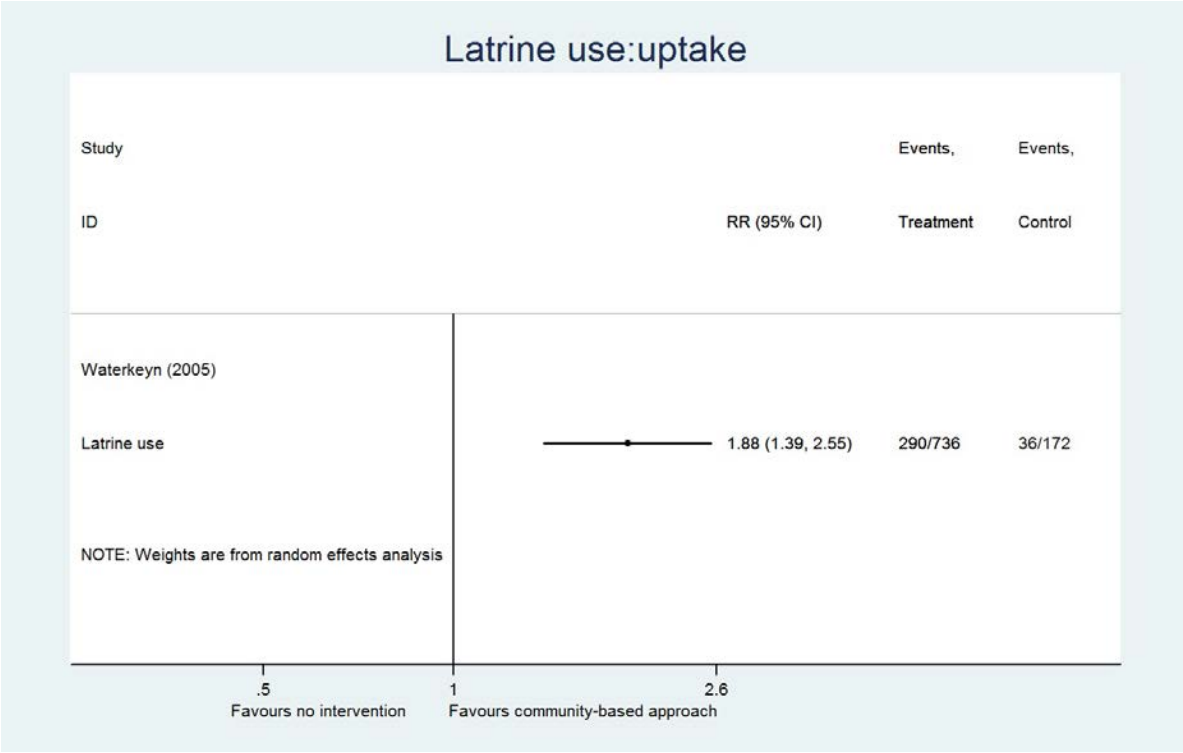


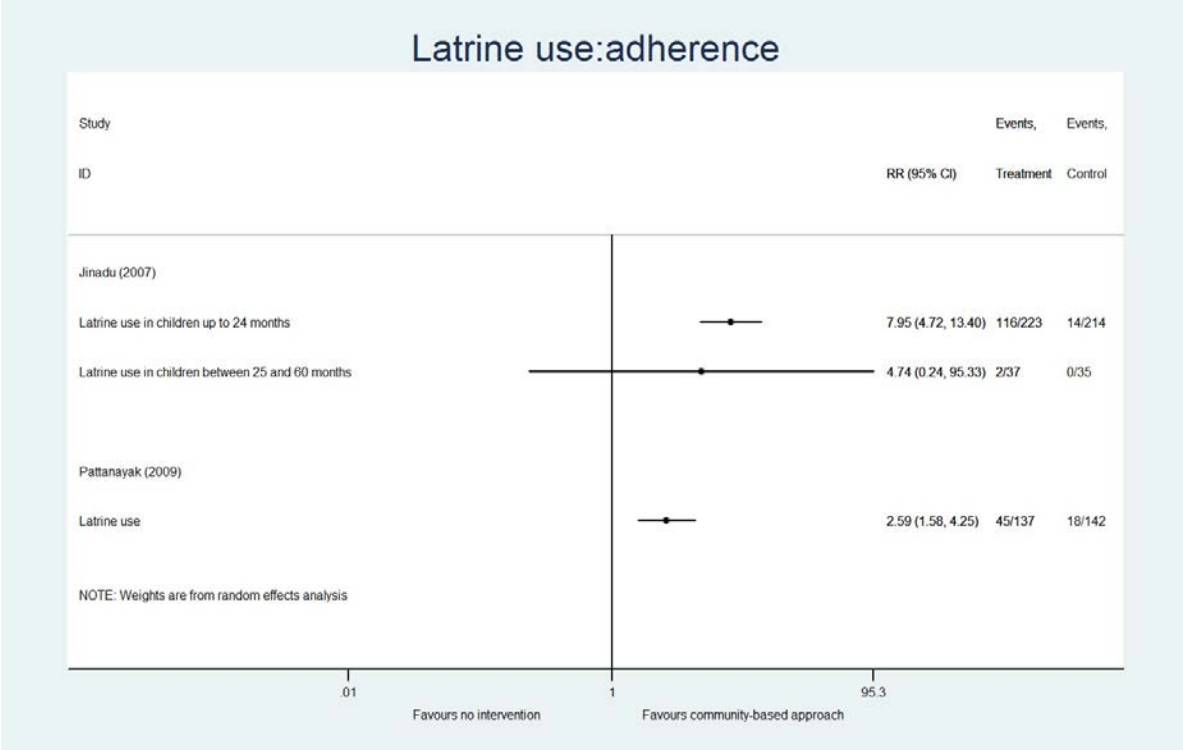


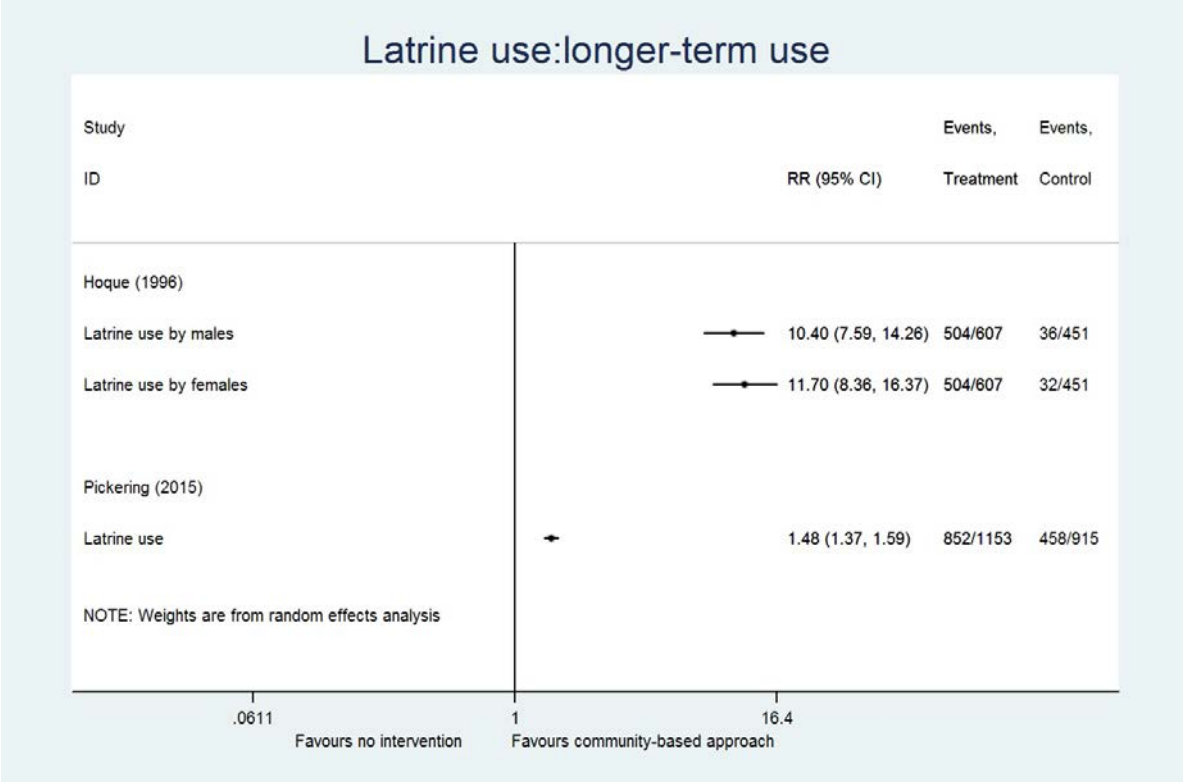


¥ One additional study measured this outcome (Kochurani 2009), but because of lack of data this study could not be added to the forest plot.

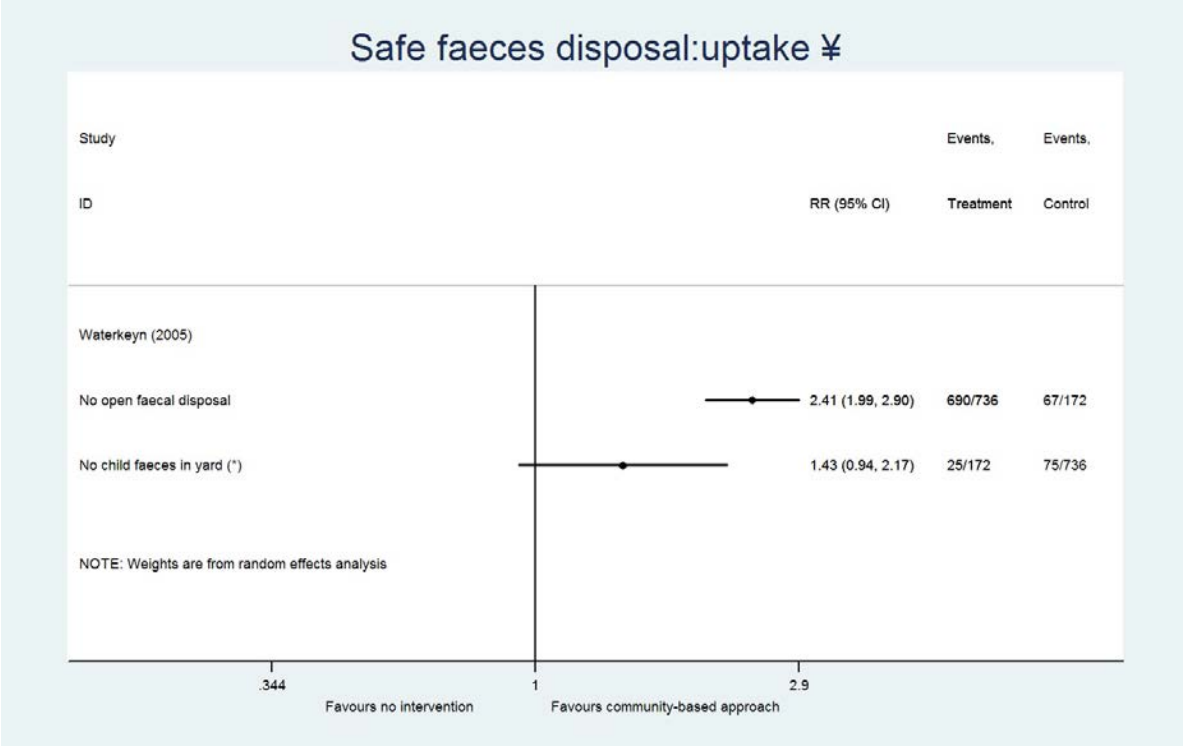
Analysis 15: Community-based approach: Latrine use







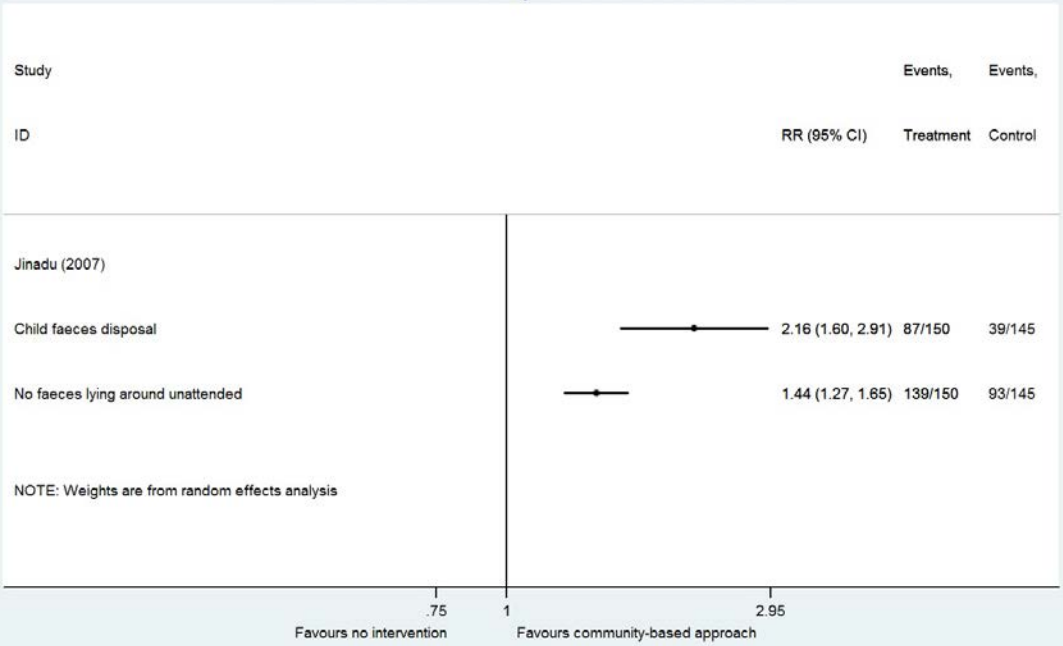
Analysis 16: Community-based approach: Safe faeces disposal



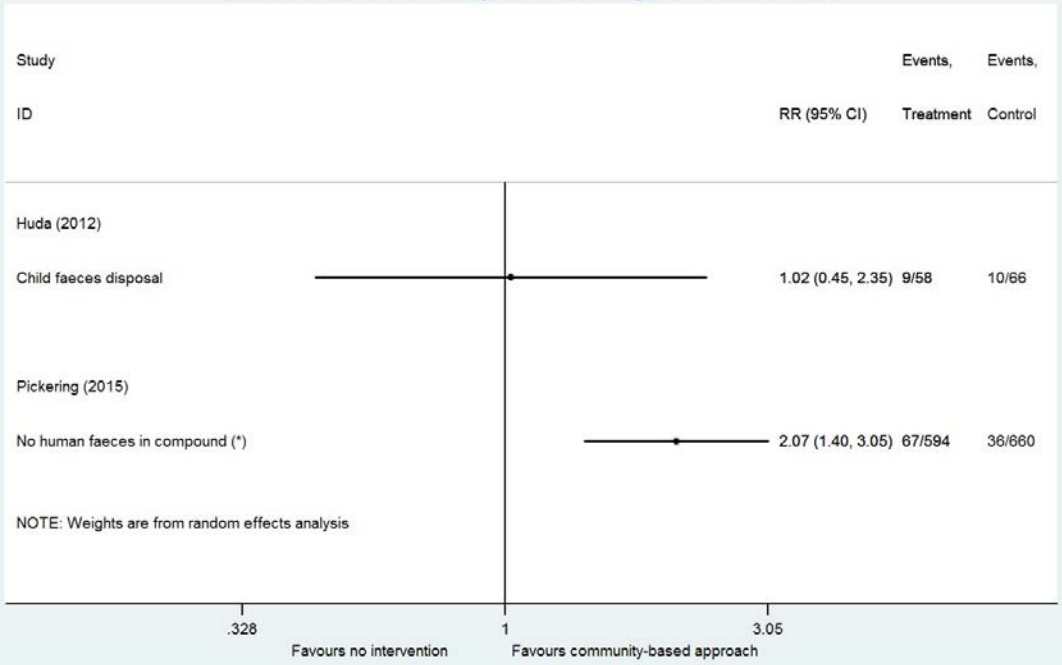
(*) outcome was reversed compared to outcome reported in paper

¥ One additional study measured this outcome (Patil 2013/2015), but because of lack of data this study could not be added to the forest plot.

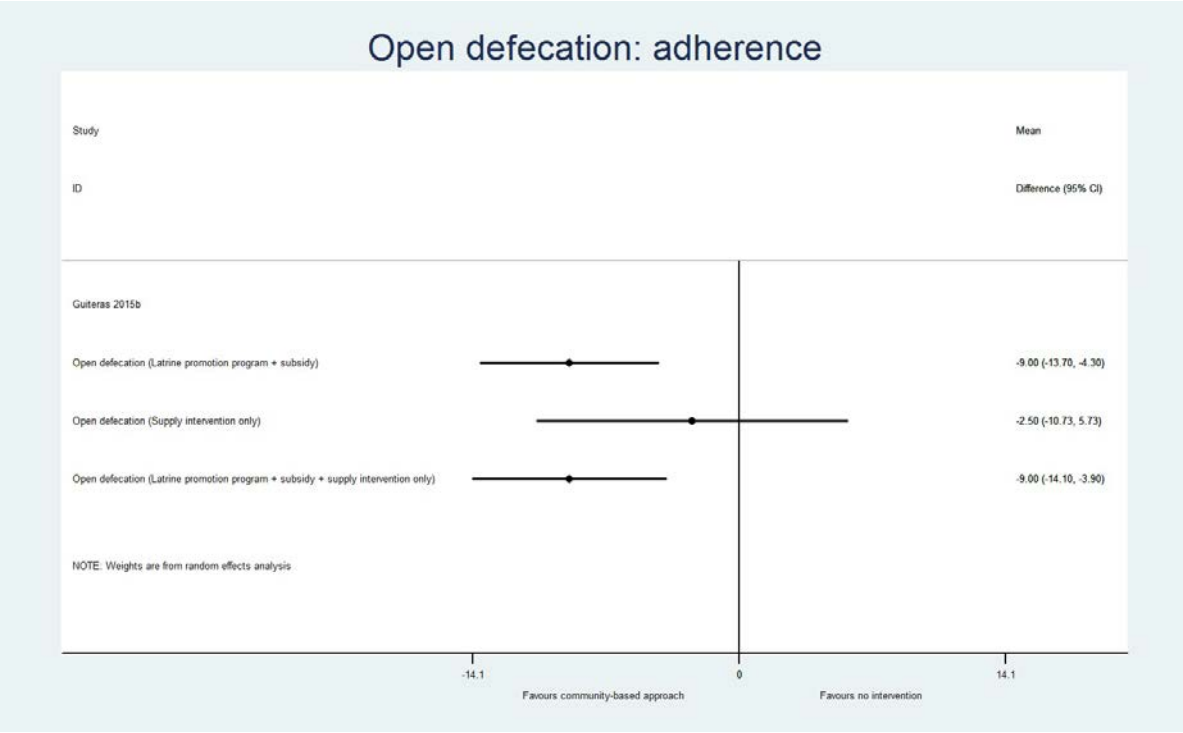
Safe faeces disposal:adherence

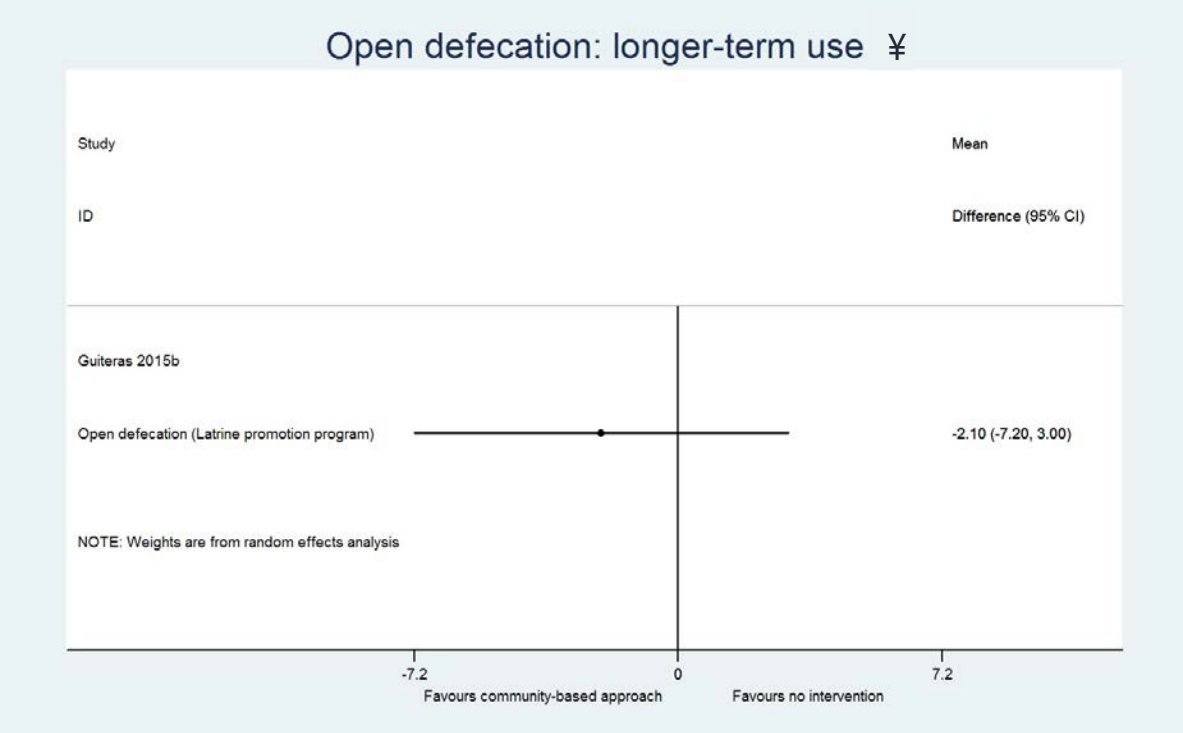


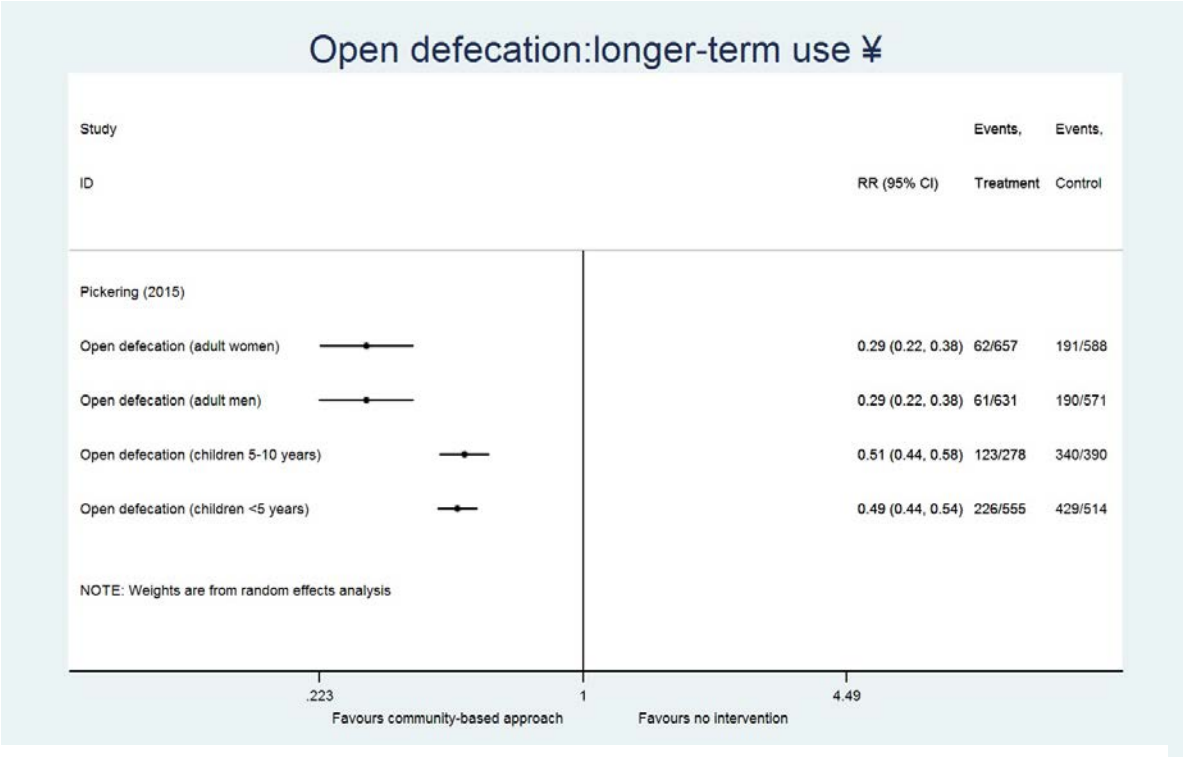
Safe faeces disposal:longer-term use



Analysis 17: Community-based approach: Open defecation

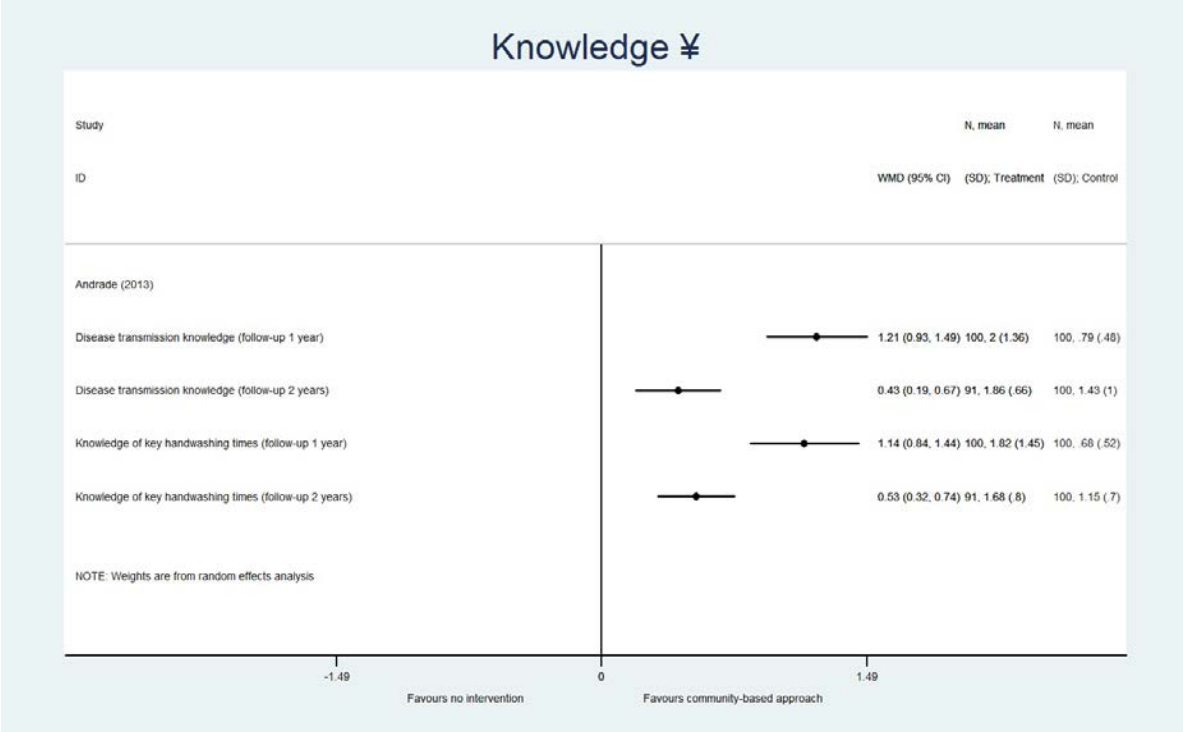






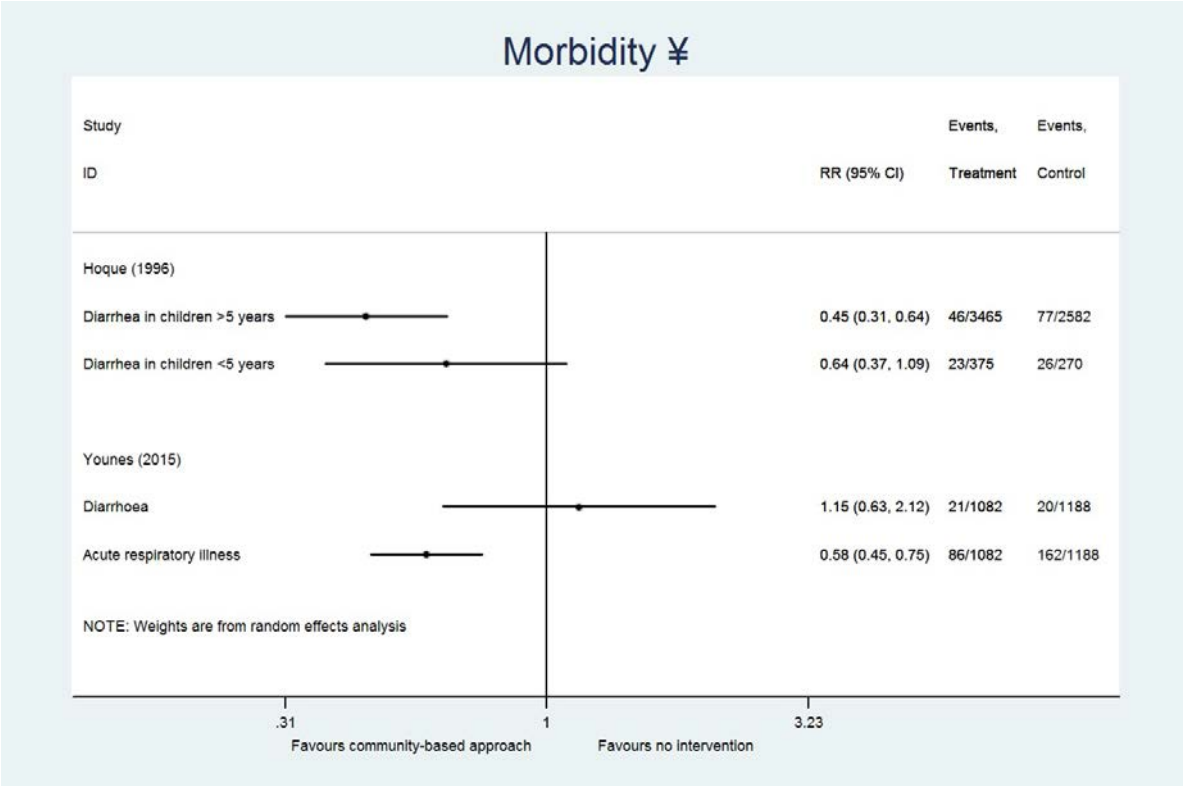
¥ Two additional studies measured this outcome (Kochurani 2009, Phuanukoonnoon 2013), but because of lack of data this study could not be added to the forest plot.

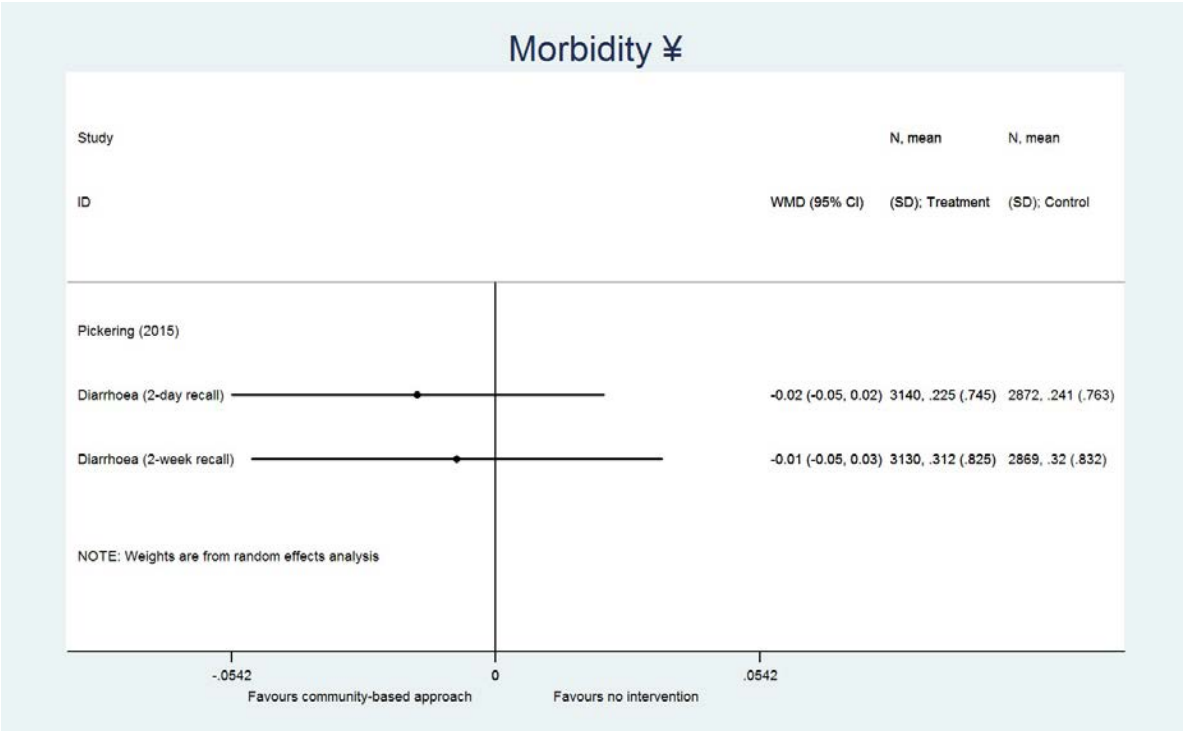
Analysis 18: Community-based approach: Behavioural factors



¥ Two additional studies measured this outcome (Kochurani 2009, Phuanukoonnoon 2013), but because of lack of data this study could not be added to the forest plot.

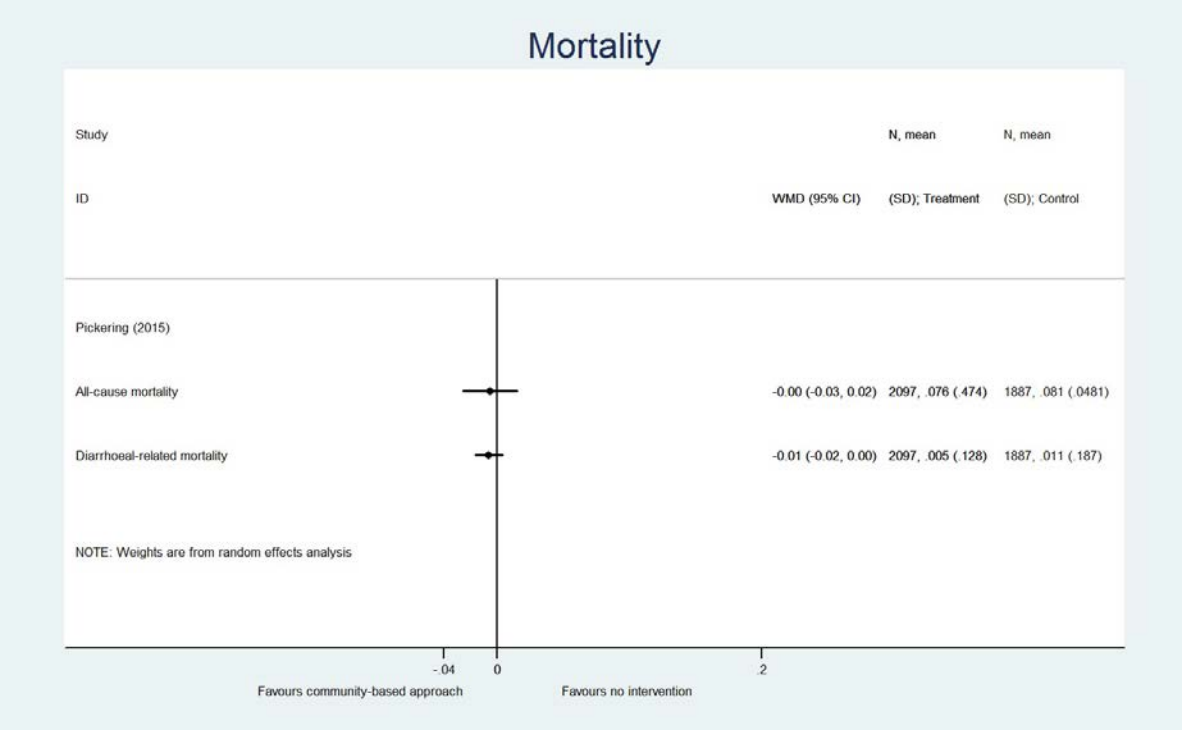
Analysis 19: Community-based approach: Morbidity



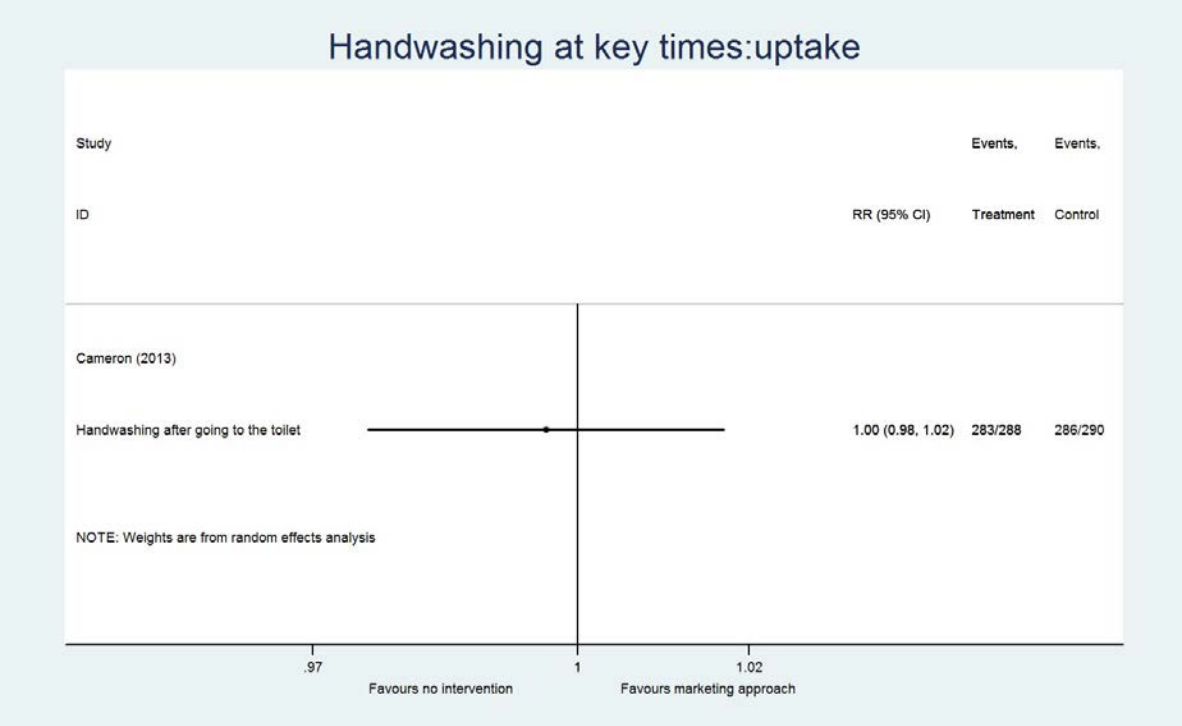


¥ One additional study measured this outcome (Huda 2012), but because of lack of data this study could not be added to the forest plot.

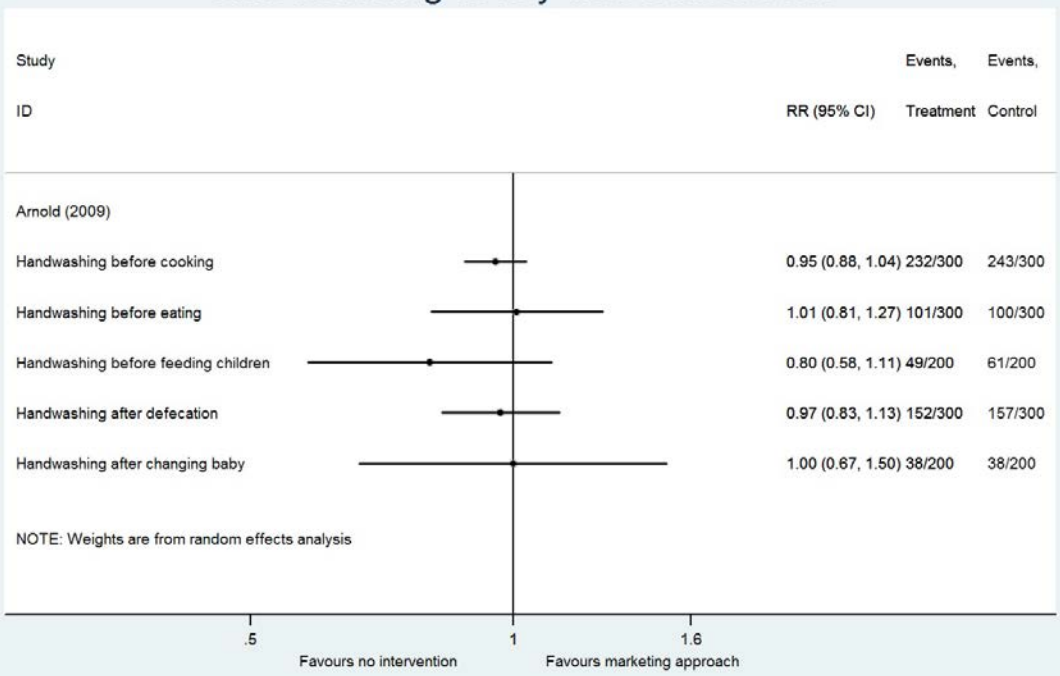
Analysis 20: Community-based approach: Mortality



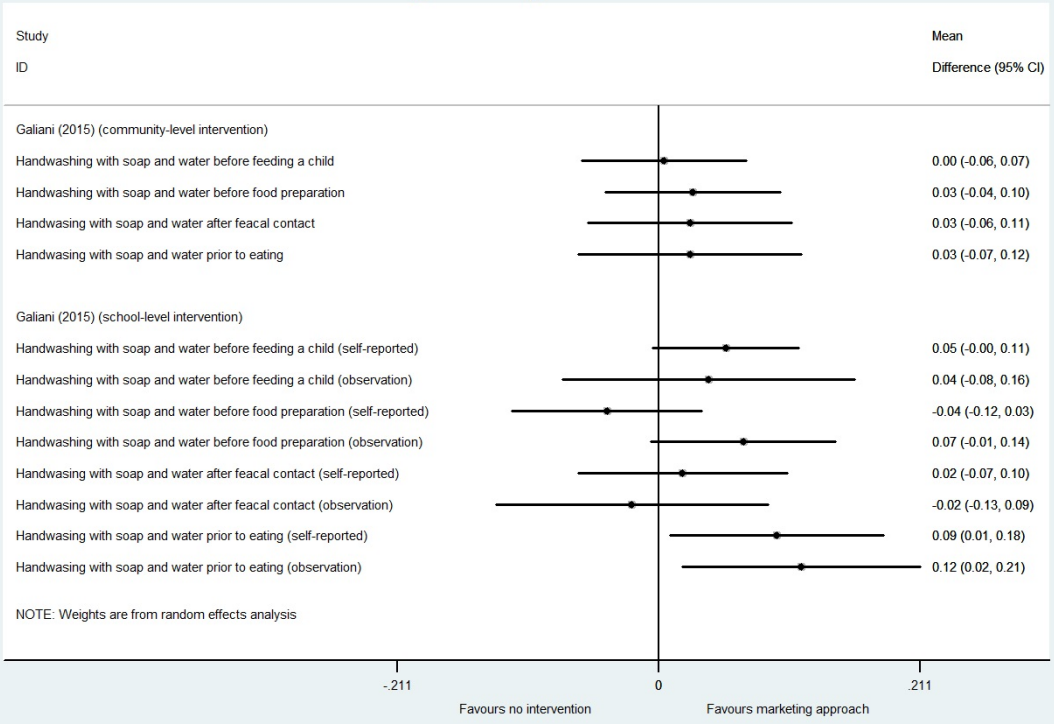
Analysis 21: Social marketing approach: Handwashing at key times

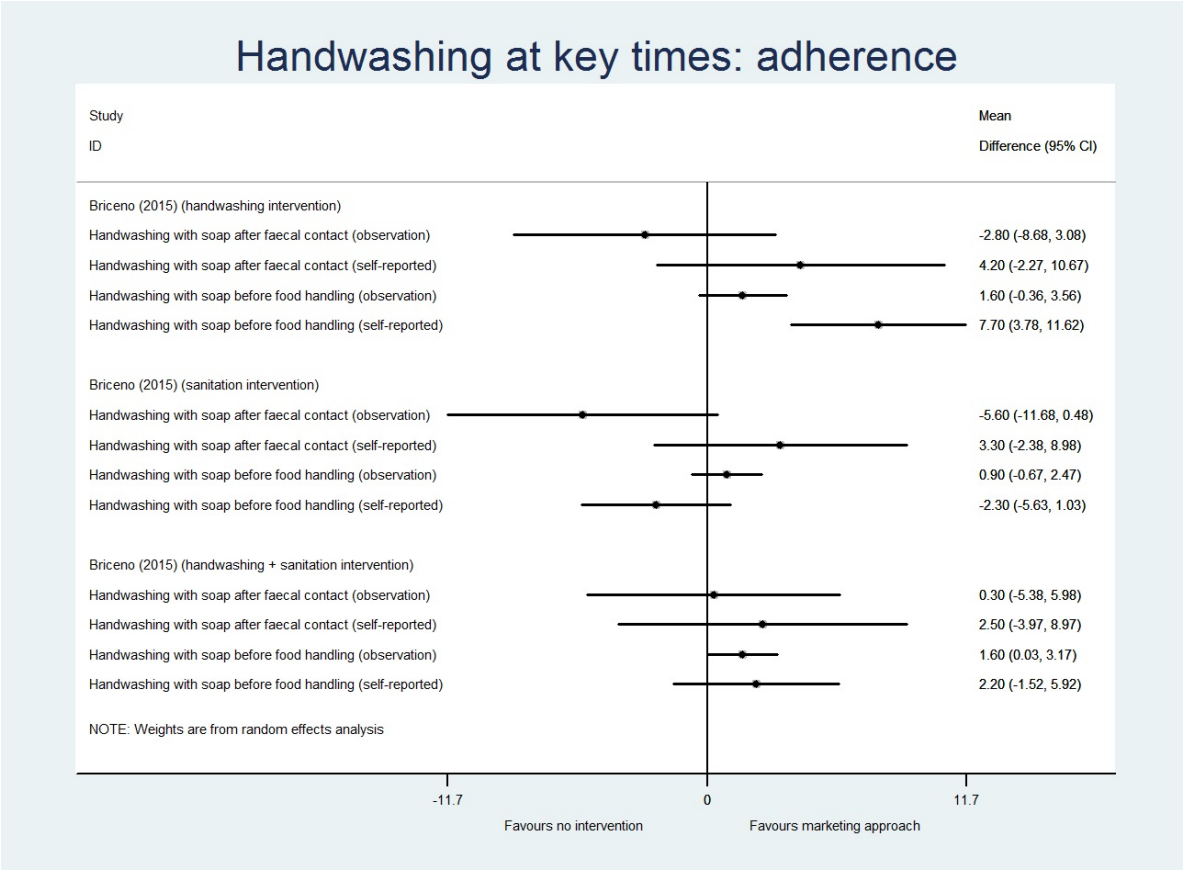


Handwashing at key times:adherence

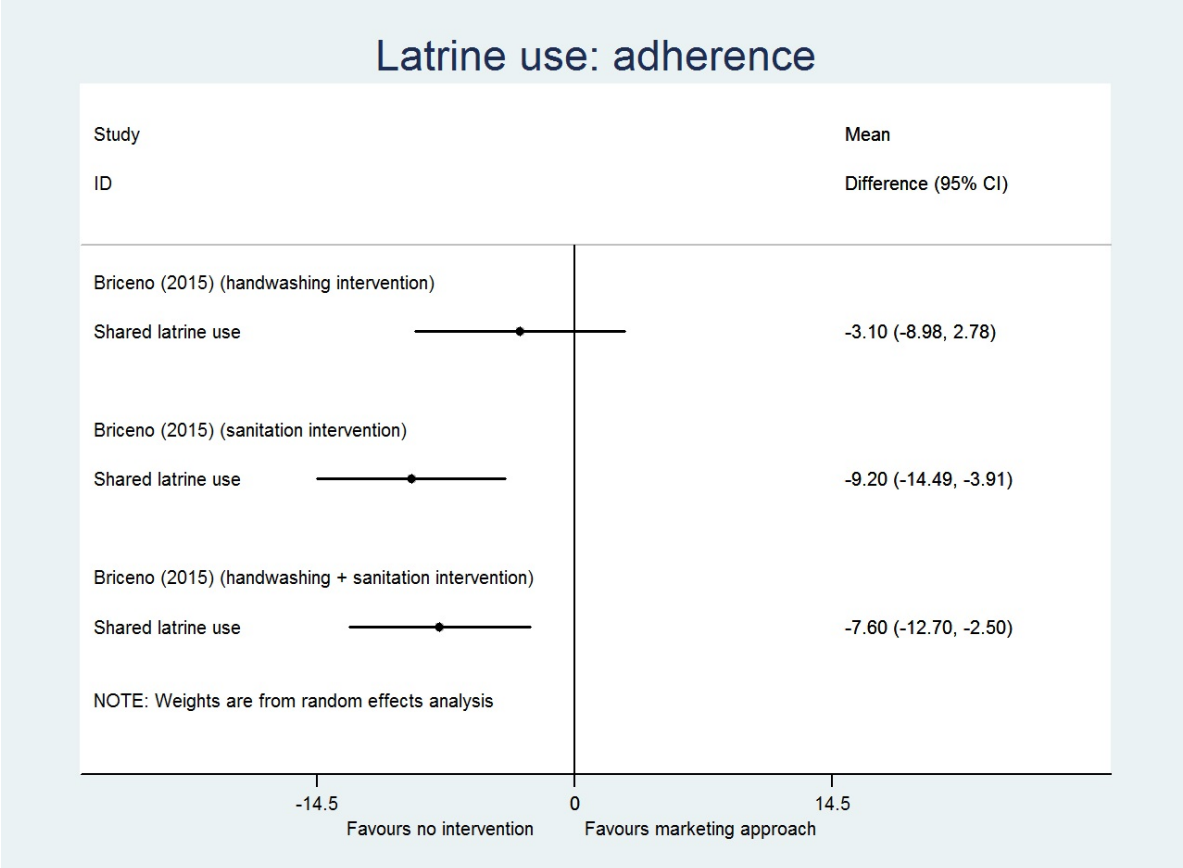


Handwashing at key times: adherence

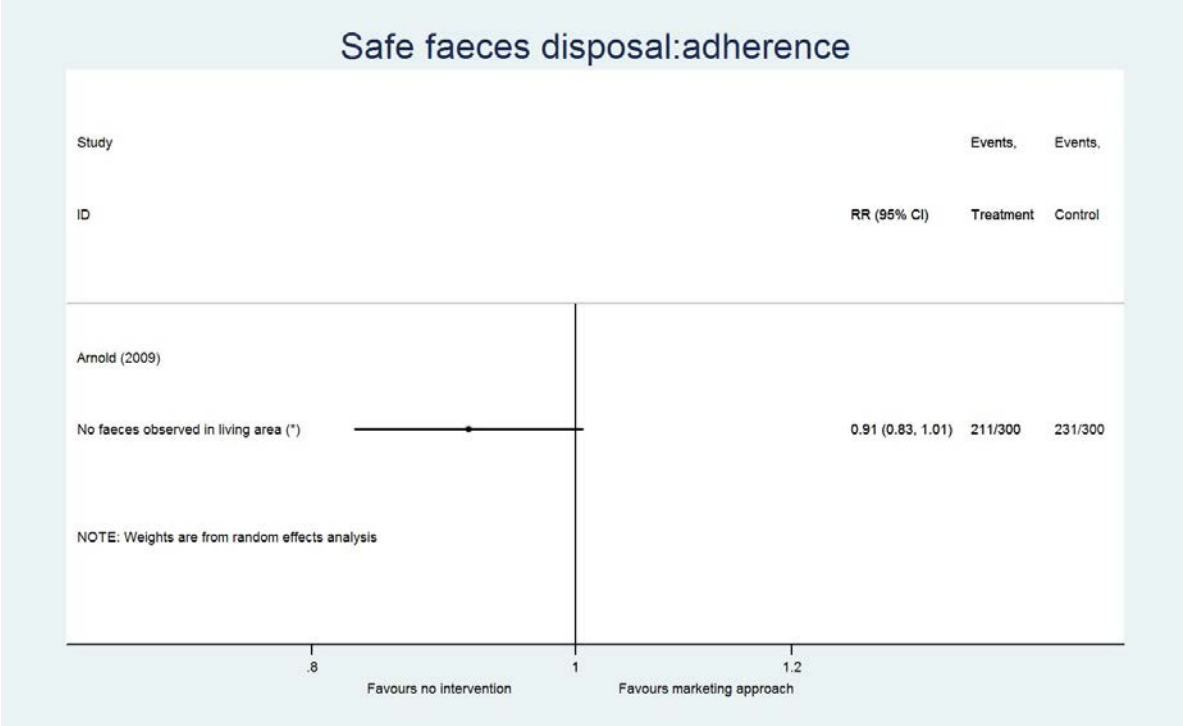




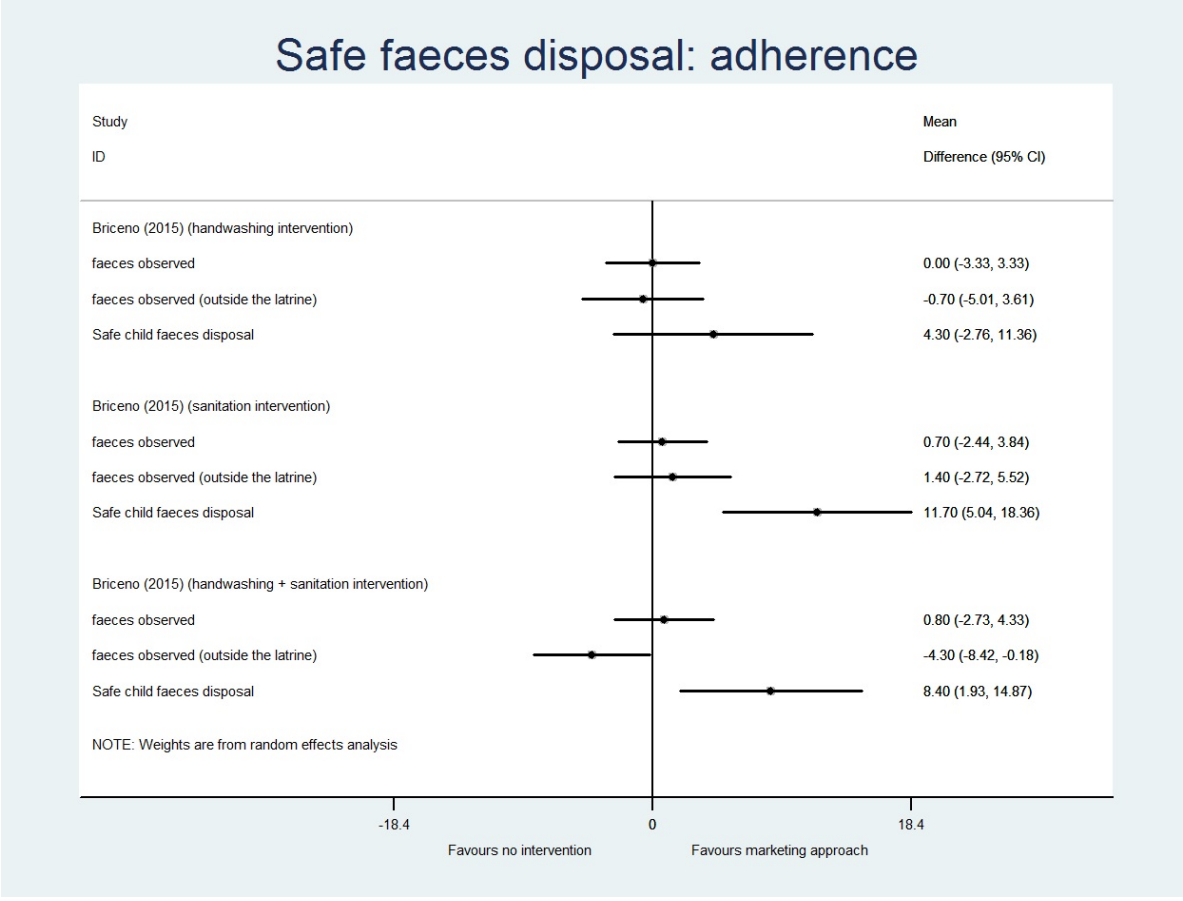
Analysis 22: Social marketing approach: Latrine use



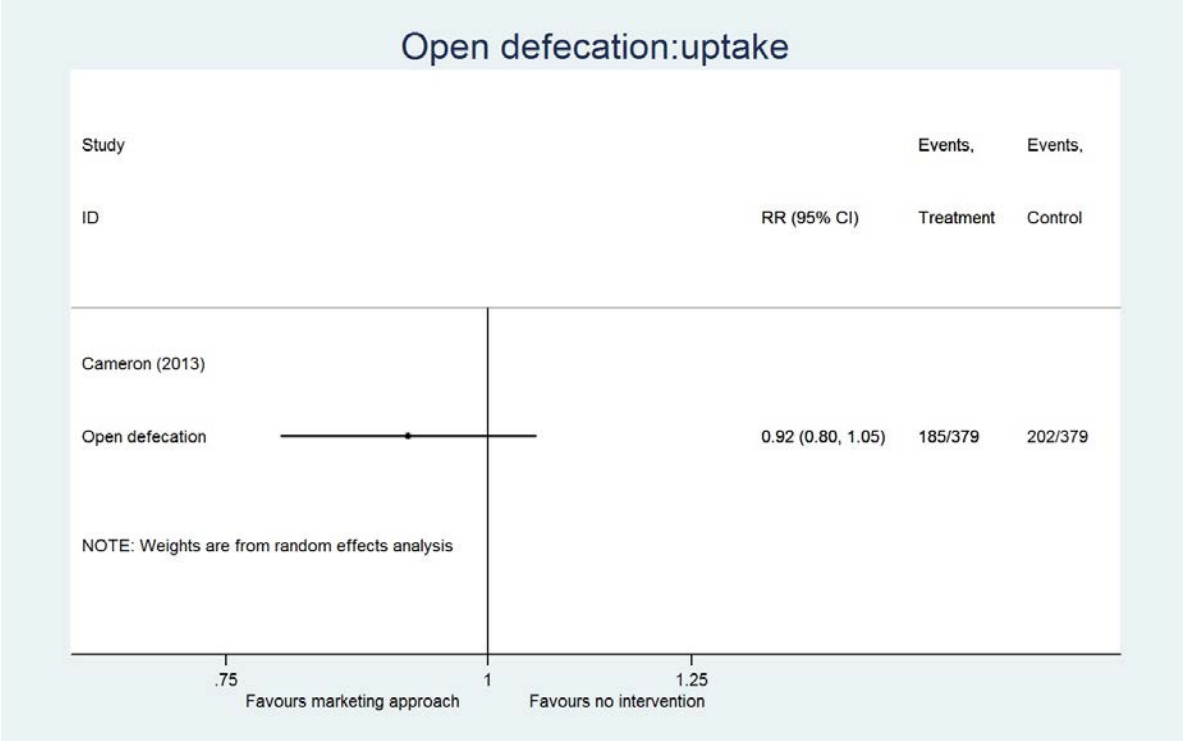
Analysis 23: Social marketing approach: Safe faeces disposal

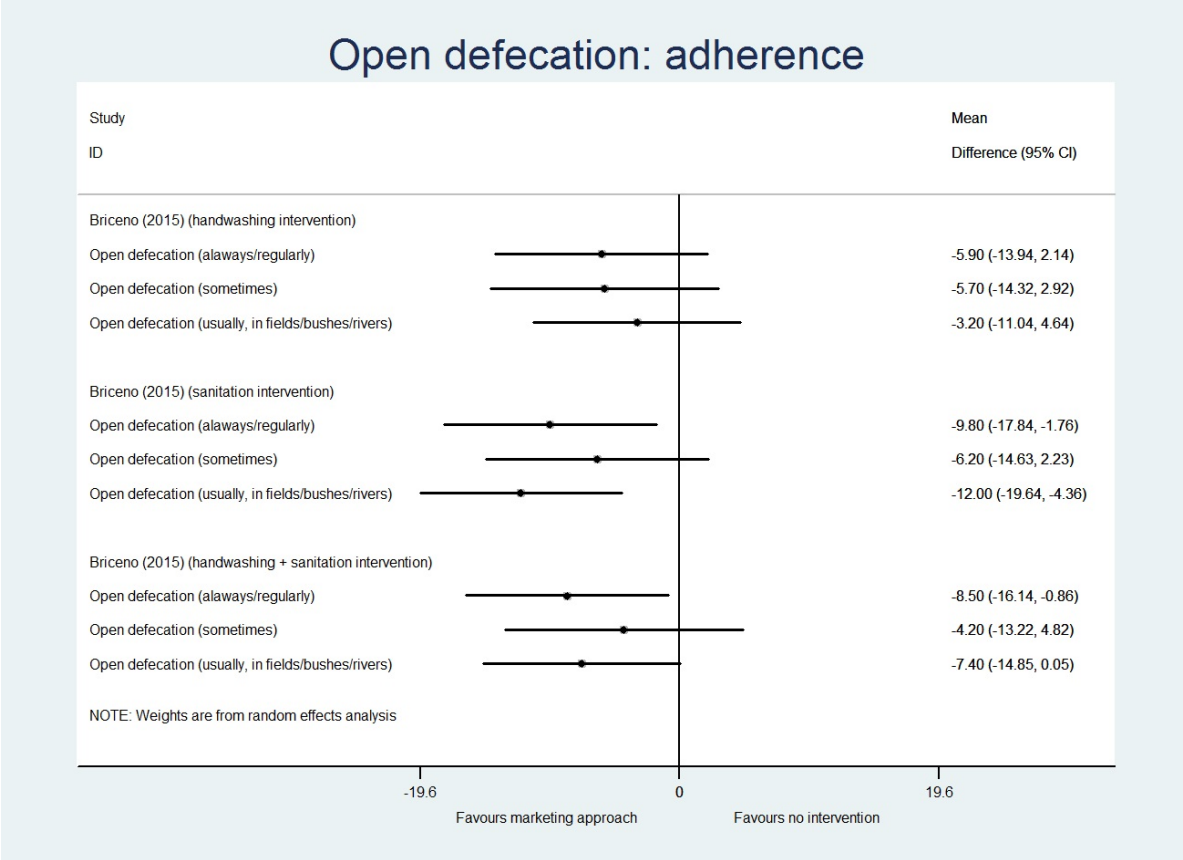


(*) outcome was reversed compared to outcome reported in paper

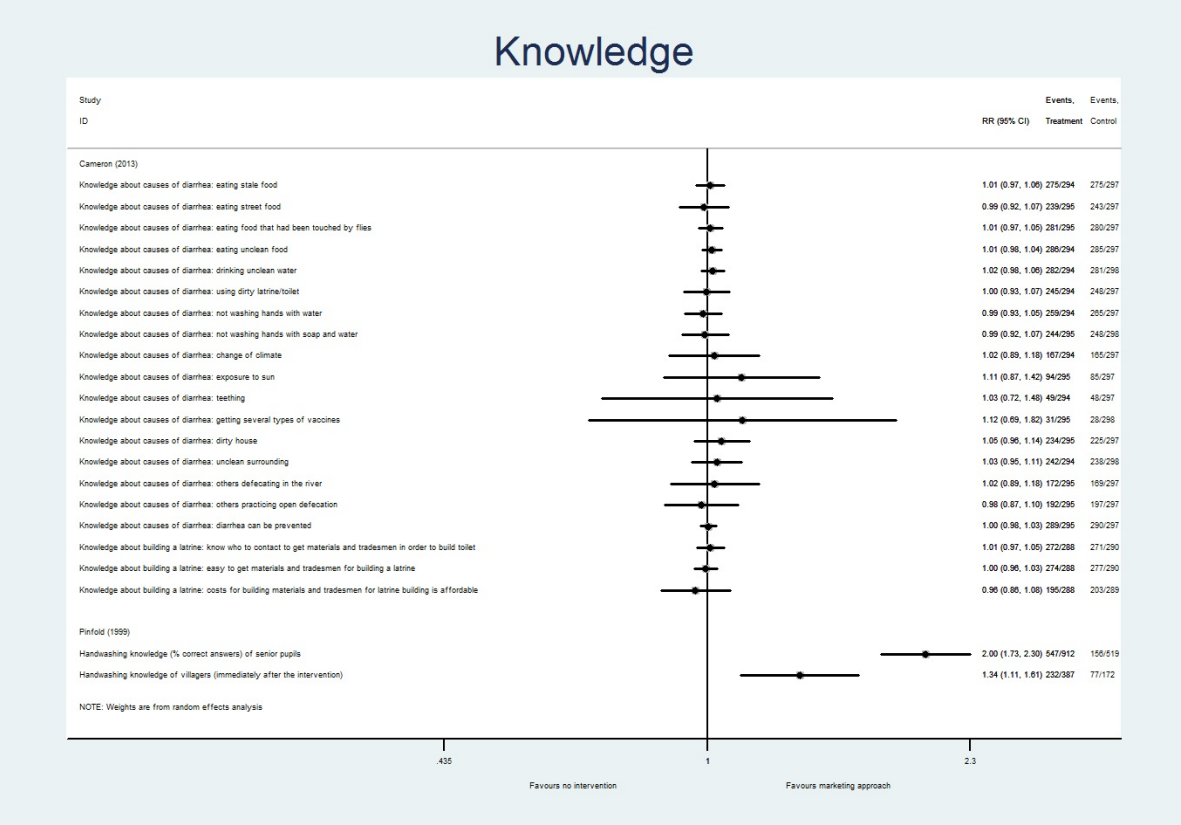


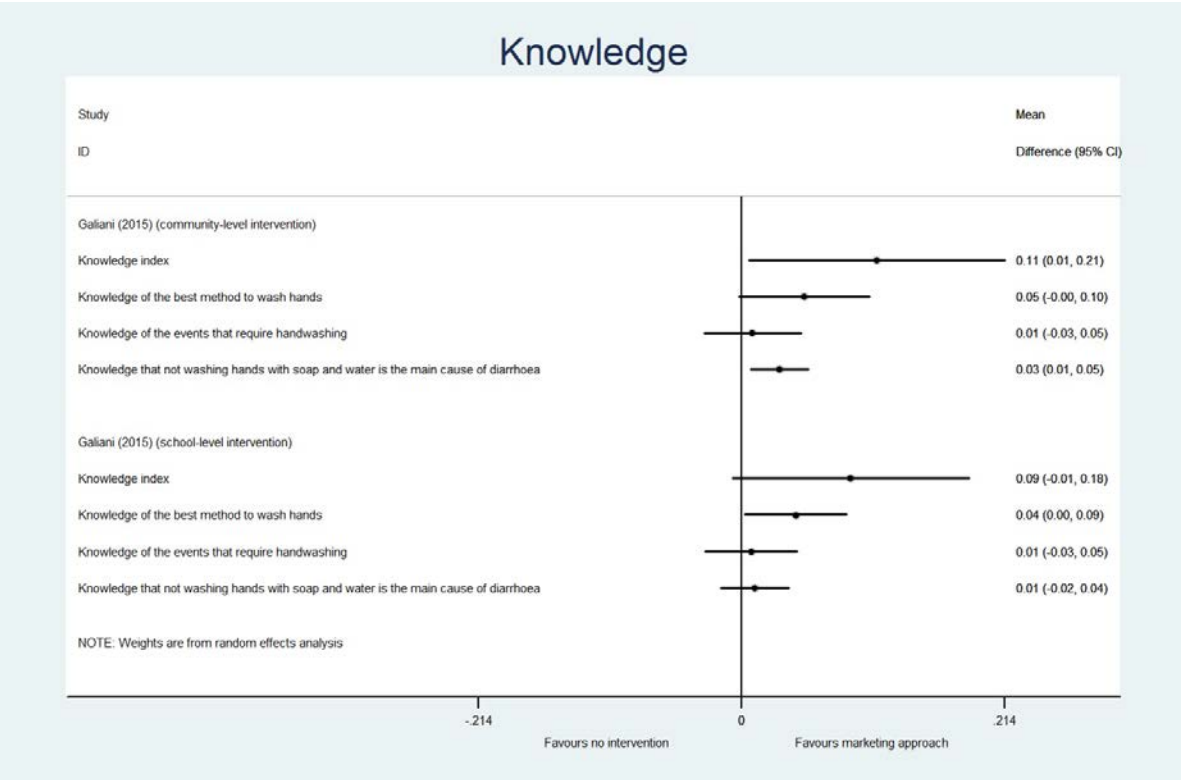
Analysis 24: Social marketing approach: Open defecation



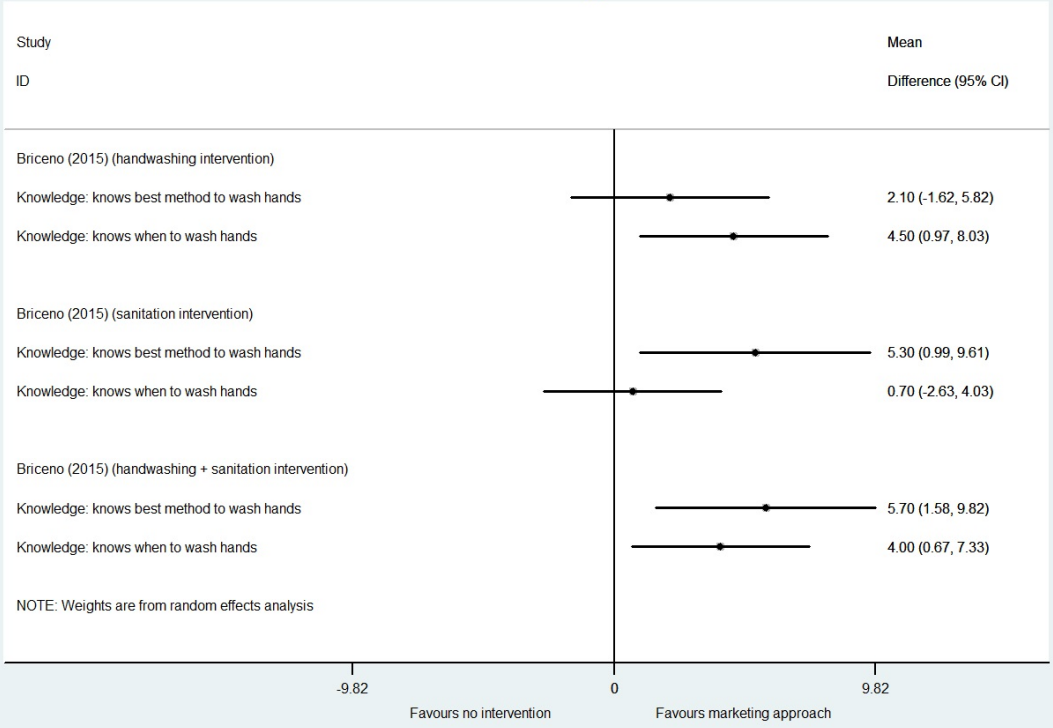


Analysis 25: Social marketing approaches: Behavioural factors

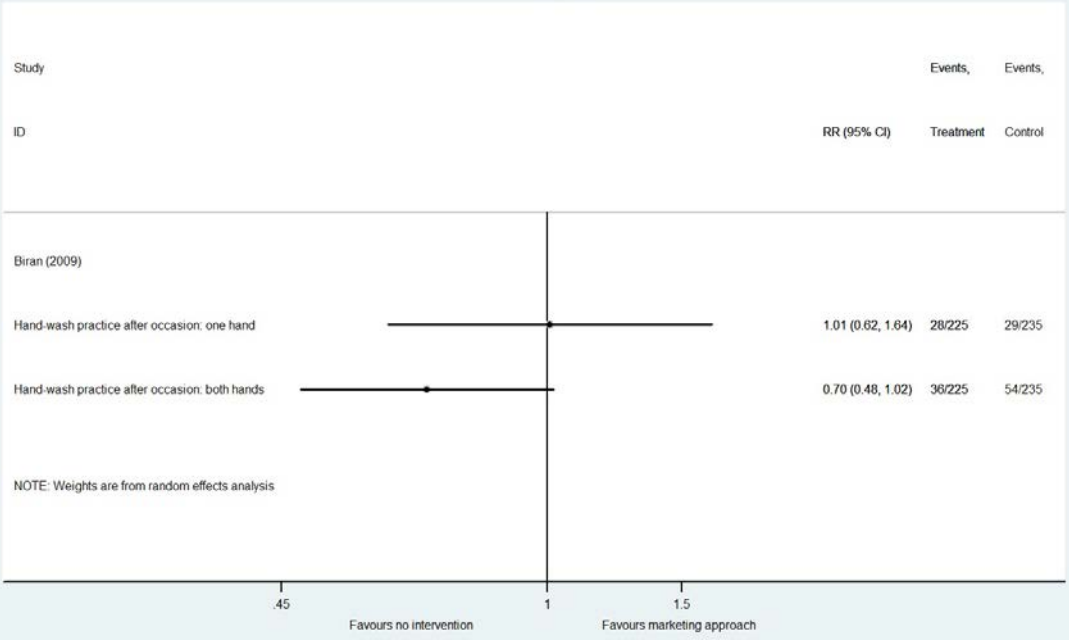




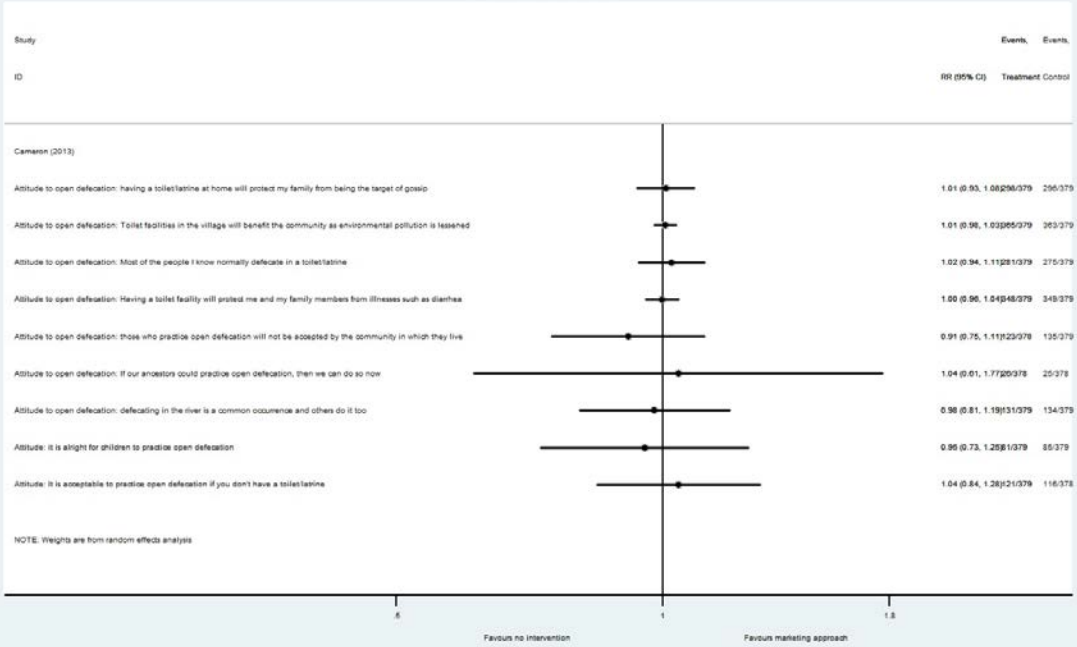
Knowledge



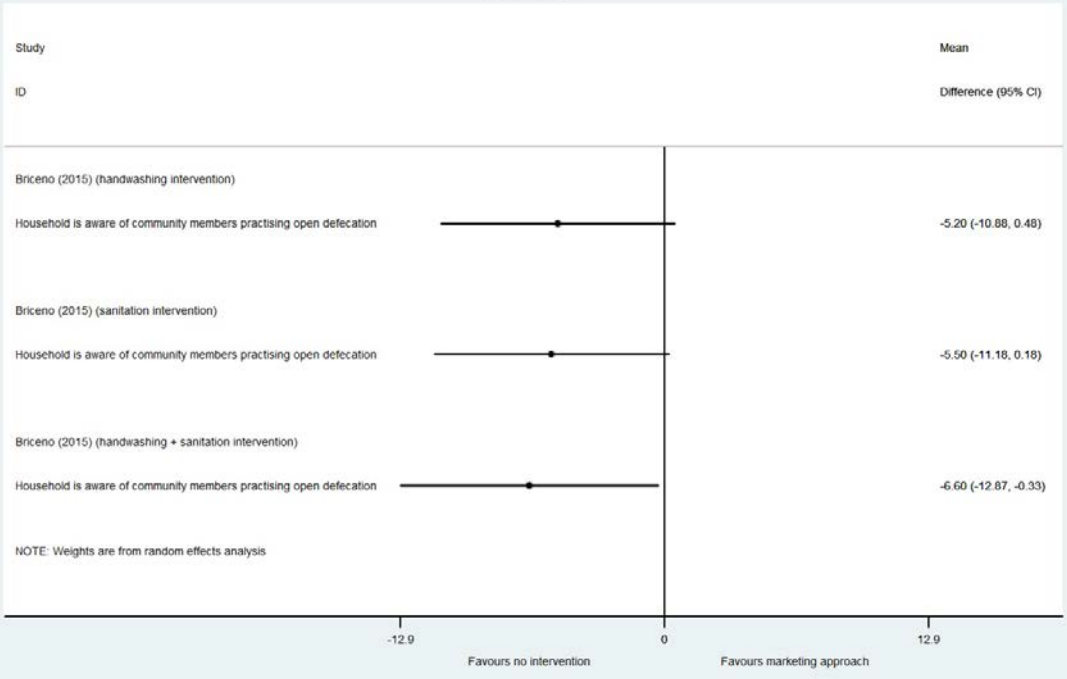
Skills



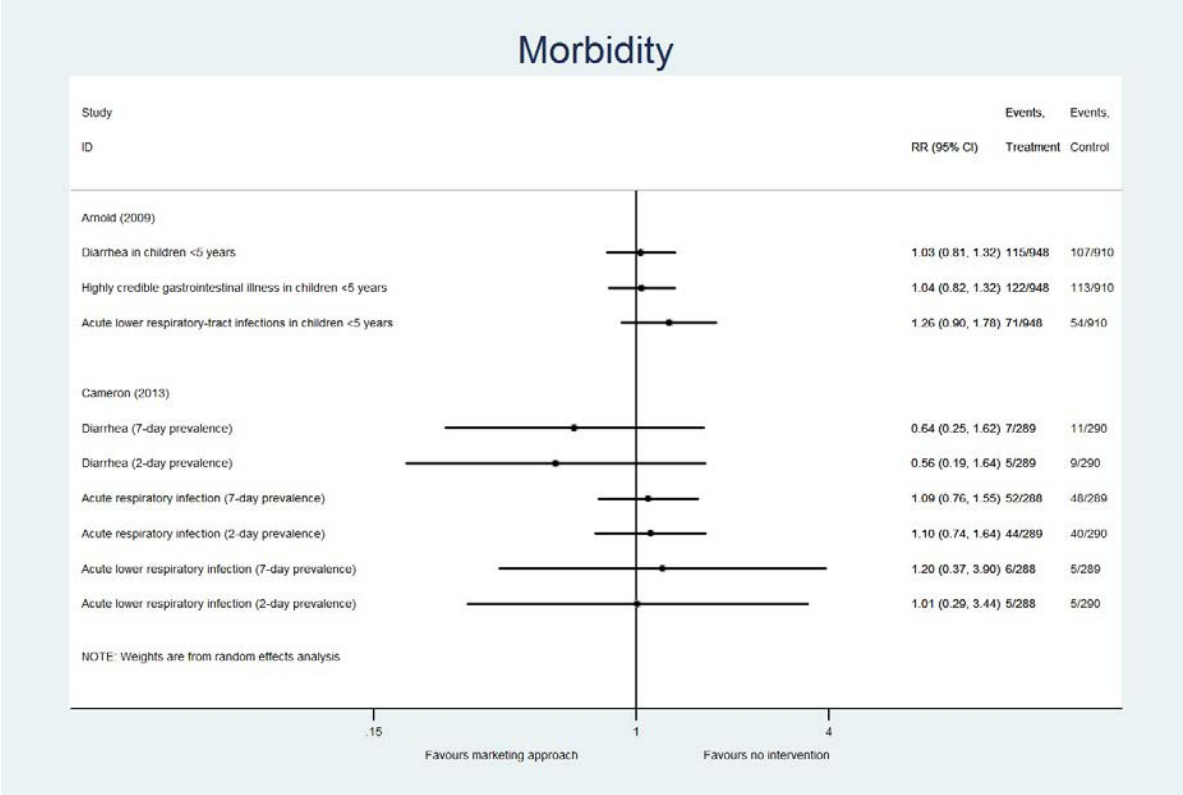
Attitudes

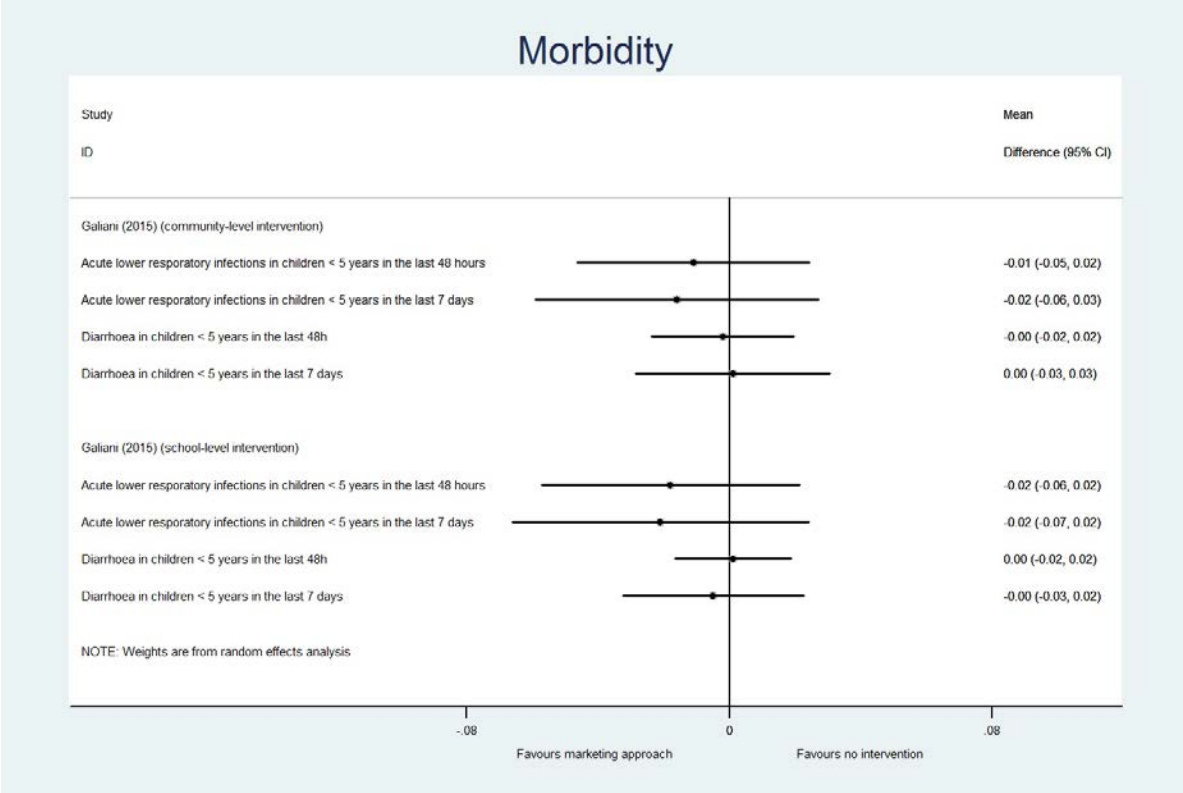


Norms

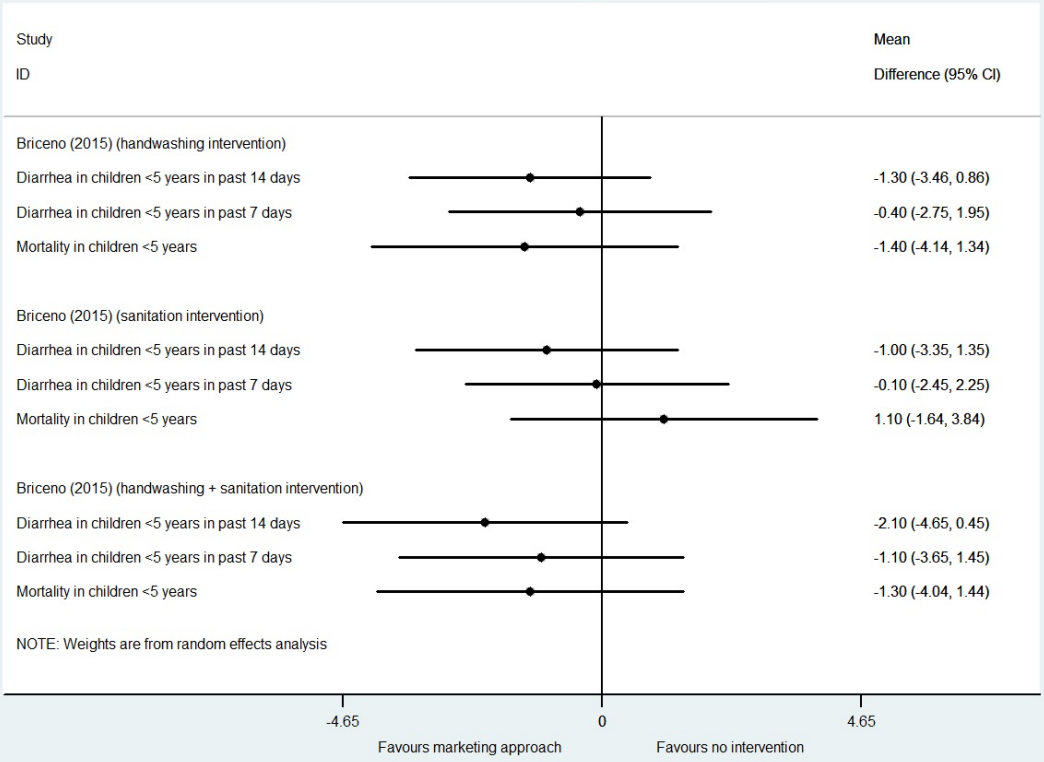


Analysis 26: Social marketing approach: Morbidity and mortality

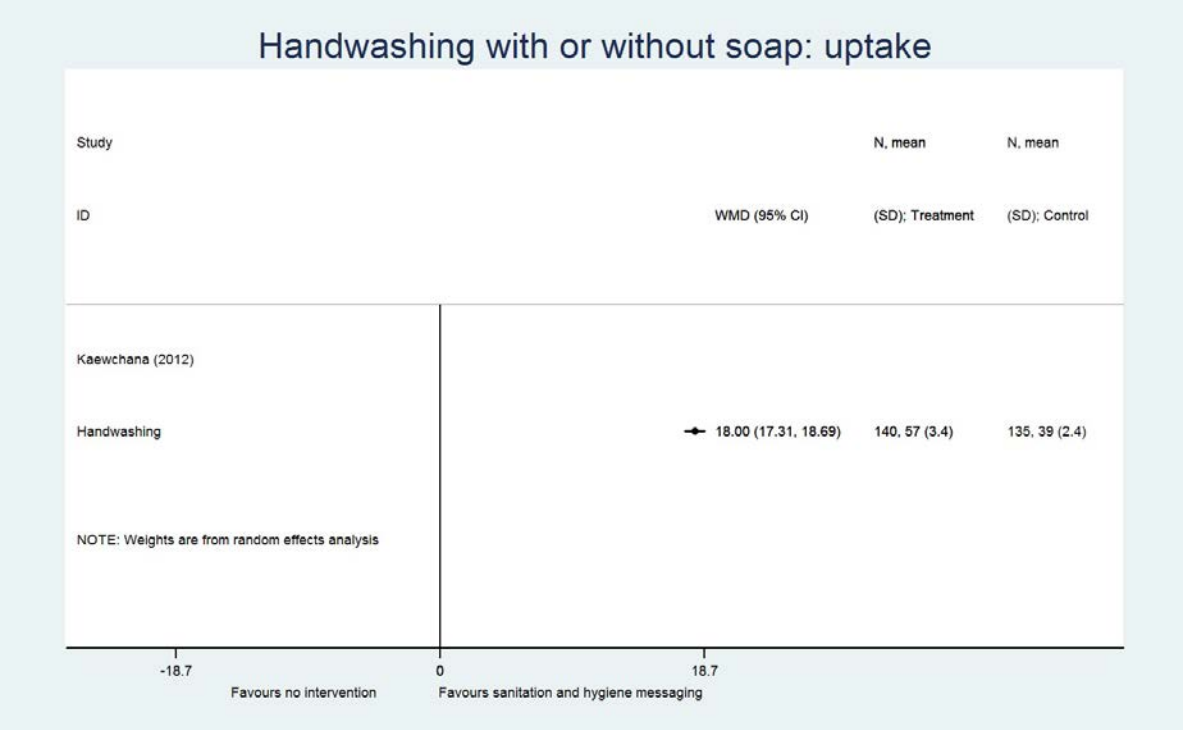


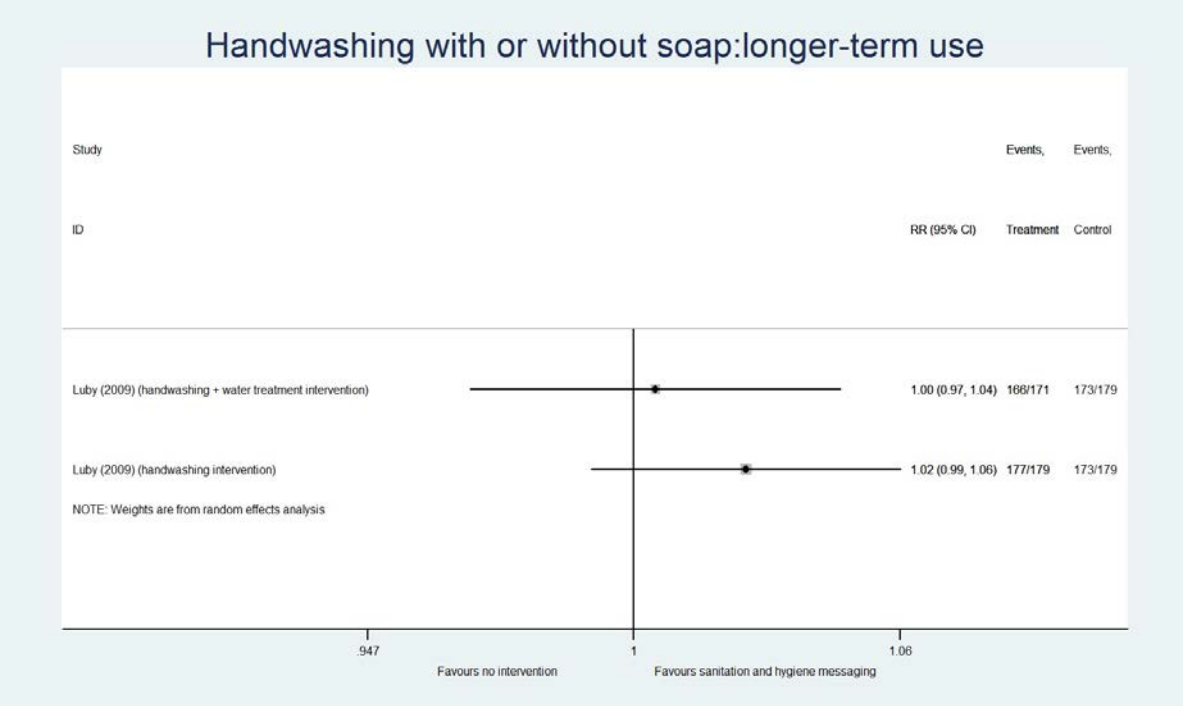


Morbidity and mortality

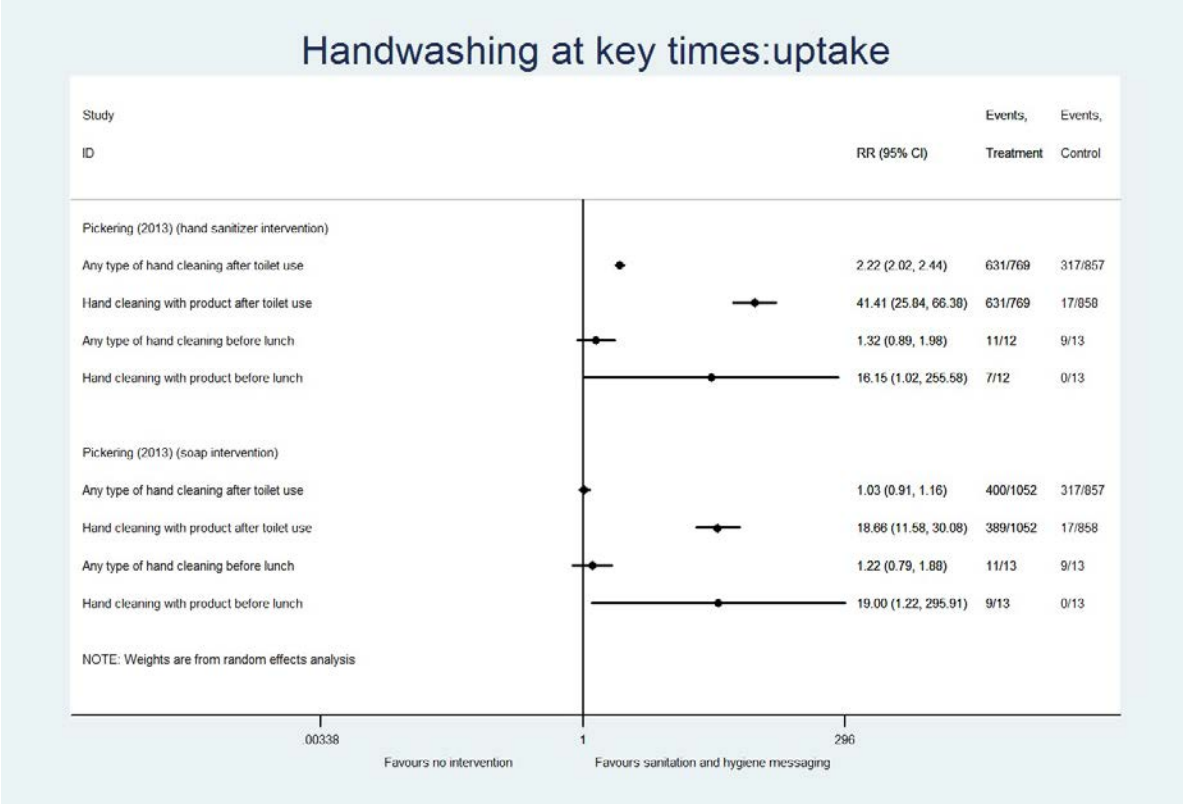


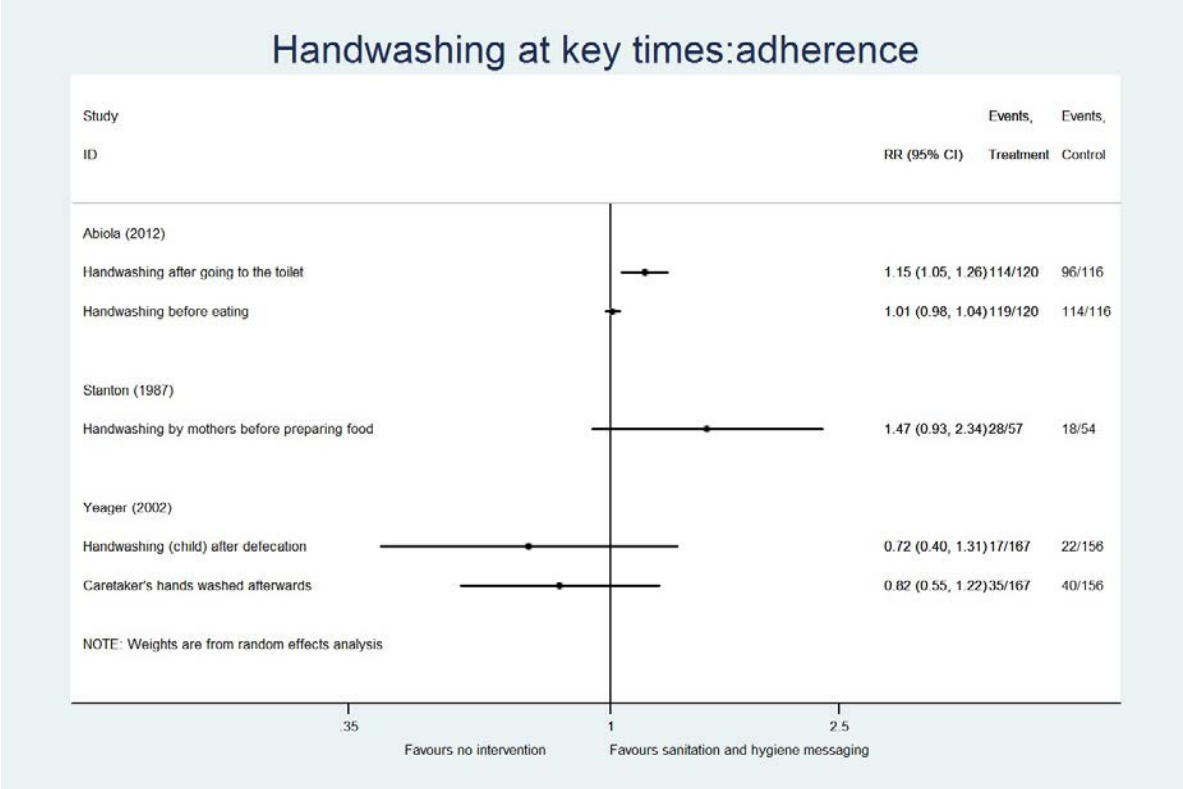
Analysis 27: Sanitation and hygiene messaging: Handwashing with or without soap

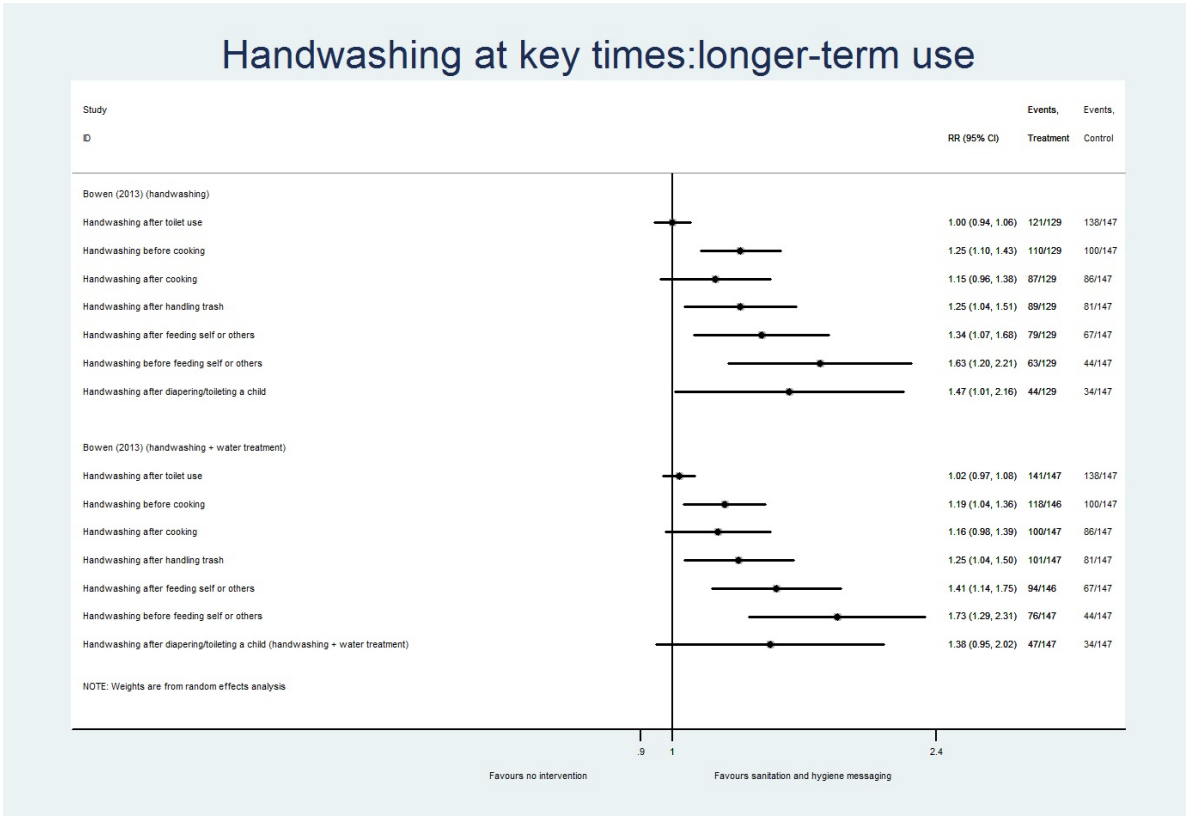




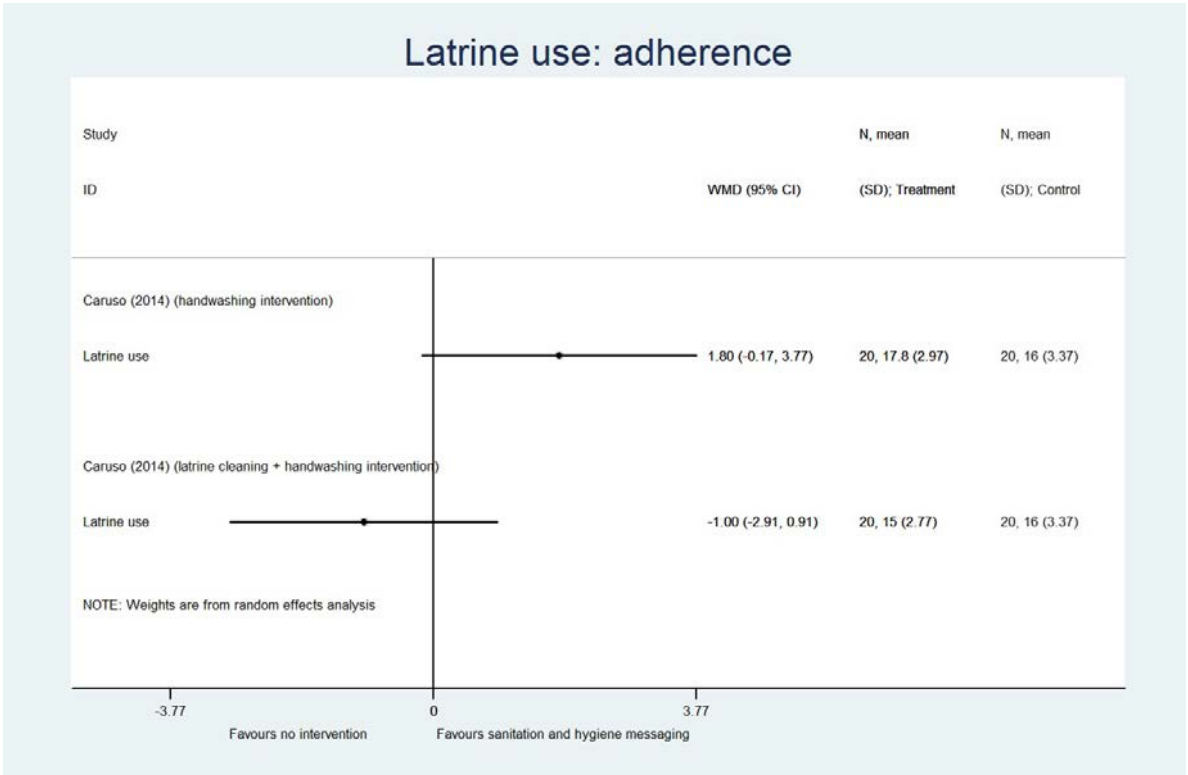
Analysis 28: Sanitation and hygiene messaging: Handwashing at key times



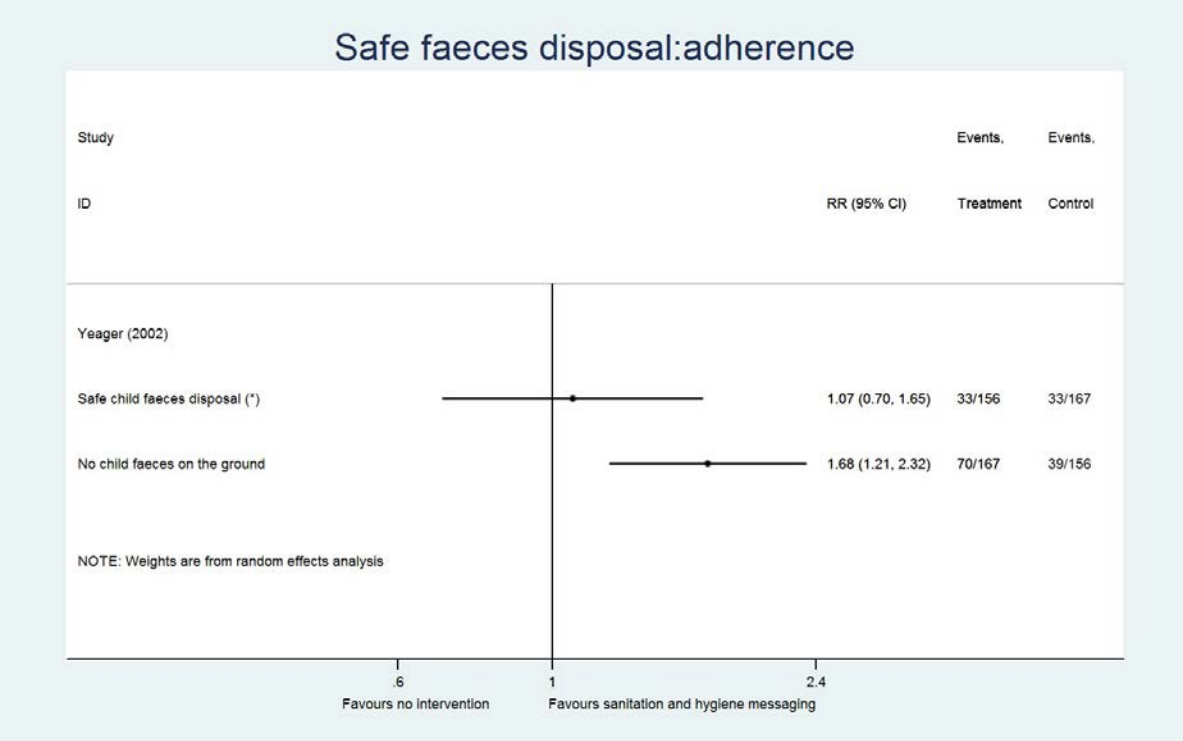




Analysis 29: Sanitation and hygiene messaging: Latrine use

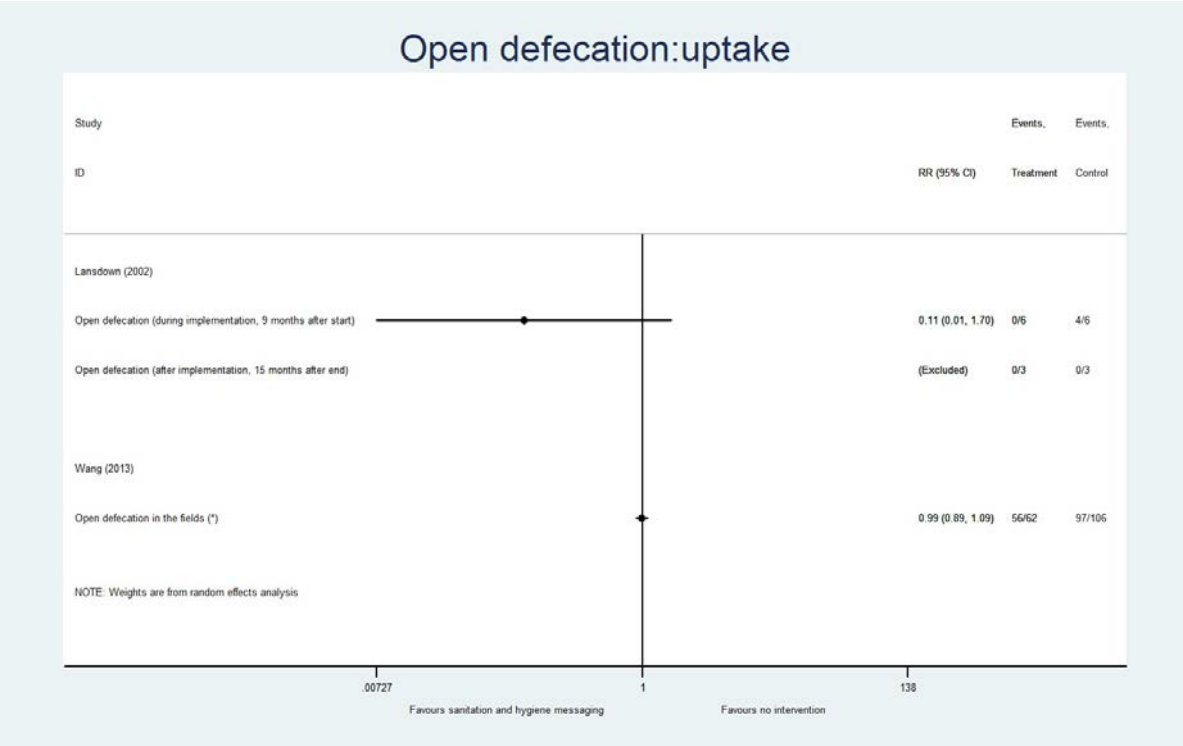


Analysis 30: Sanitation and hygiene messaging: Safe faeces disposal

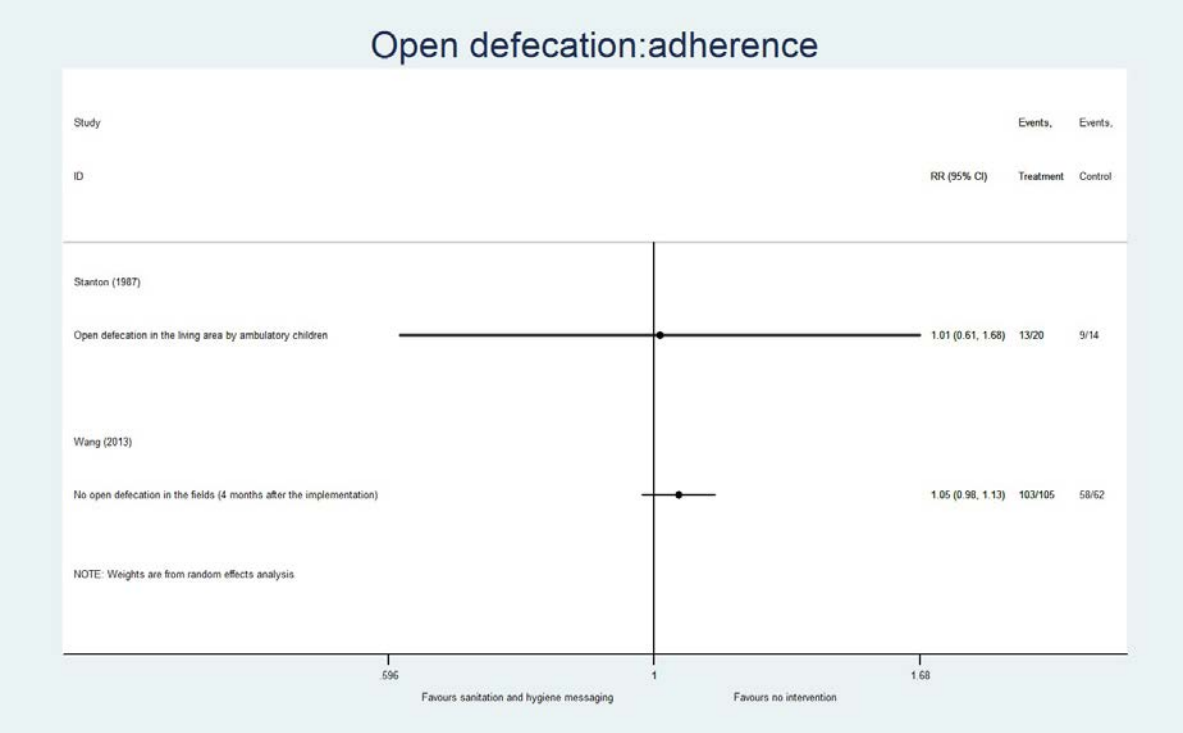


(*) outcome was reversed compared to outcome reported in paper

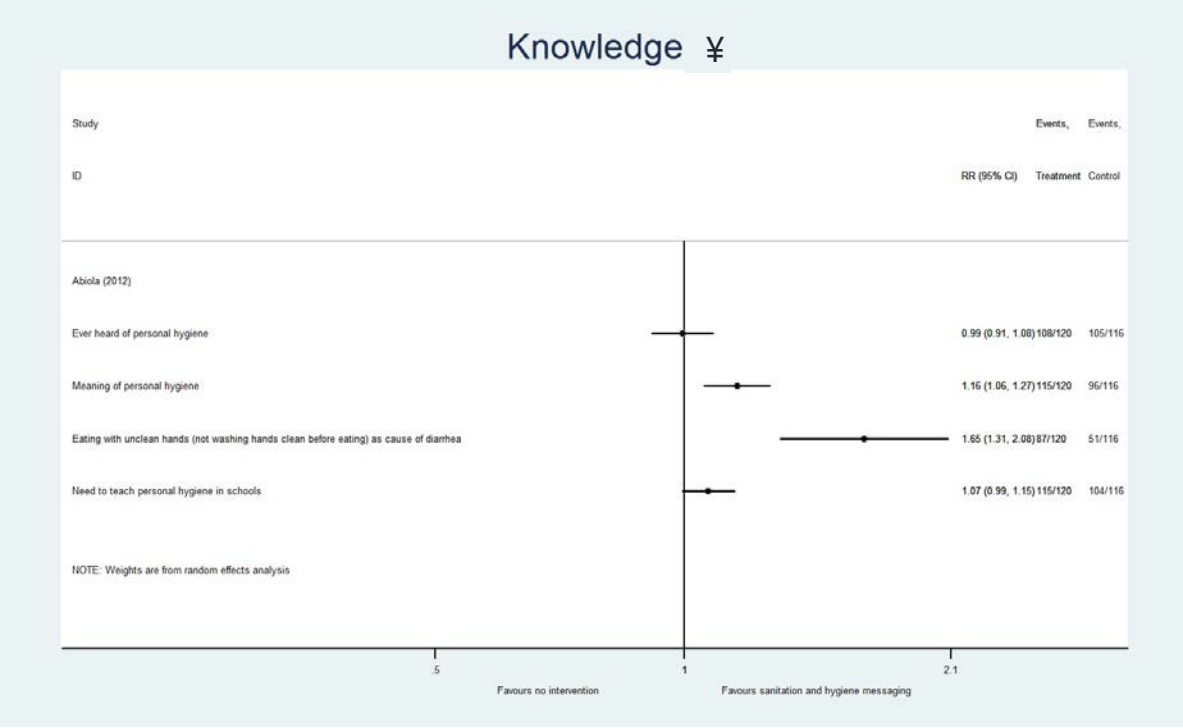
Analysis 31: Sanitation and hygiene messaging: Open defecation

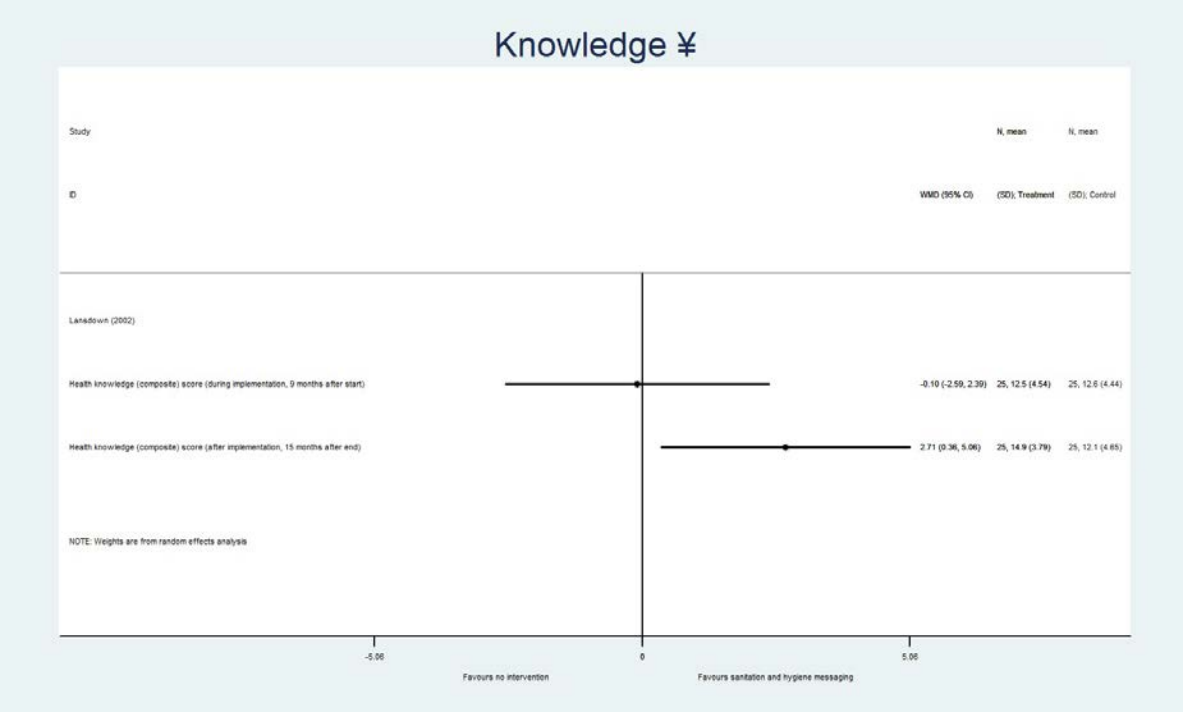


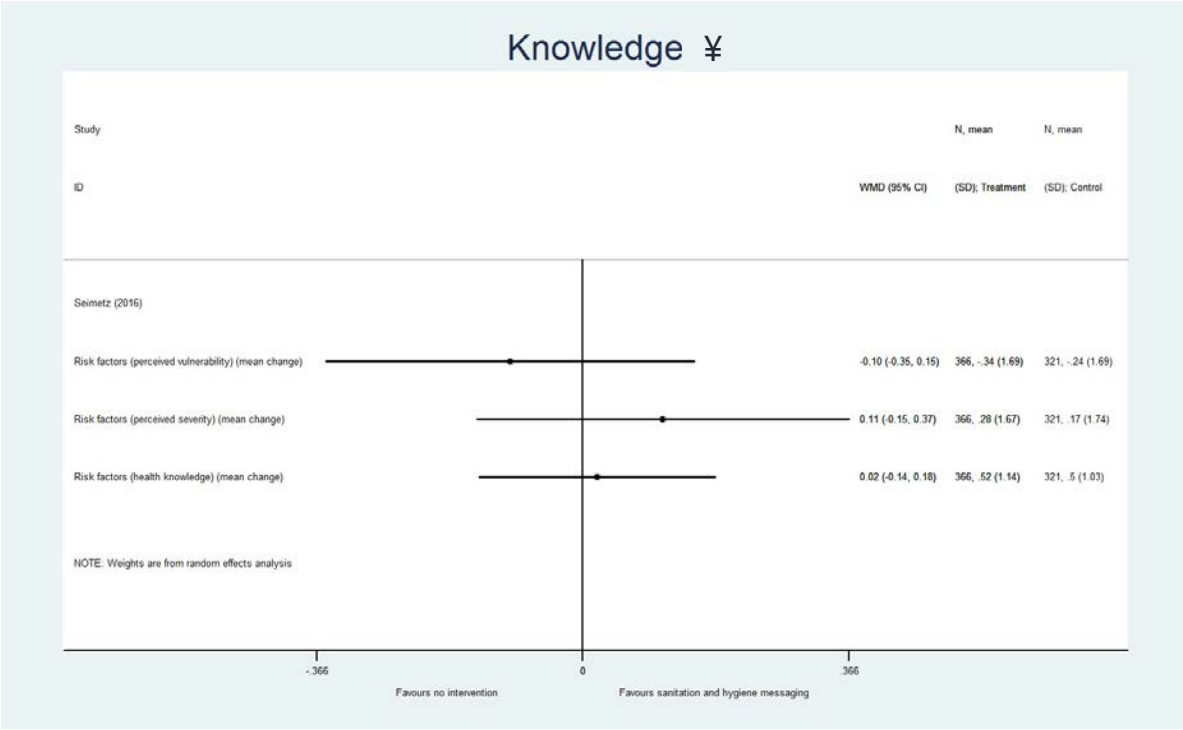
(*) outcome was reversed compared to outcome reported in paper



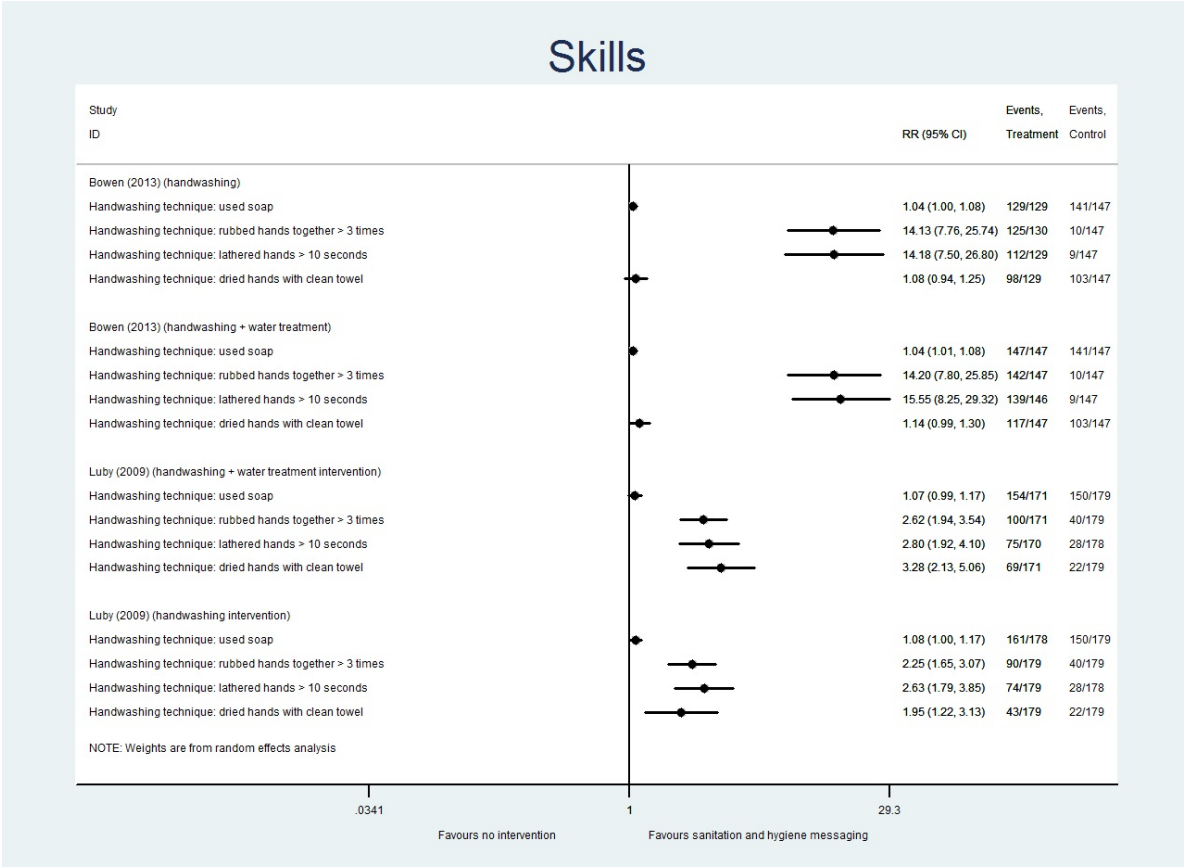
Analysis 32: Sanitation and hygiene messaging: Behavioural factors



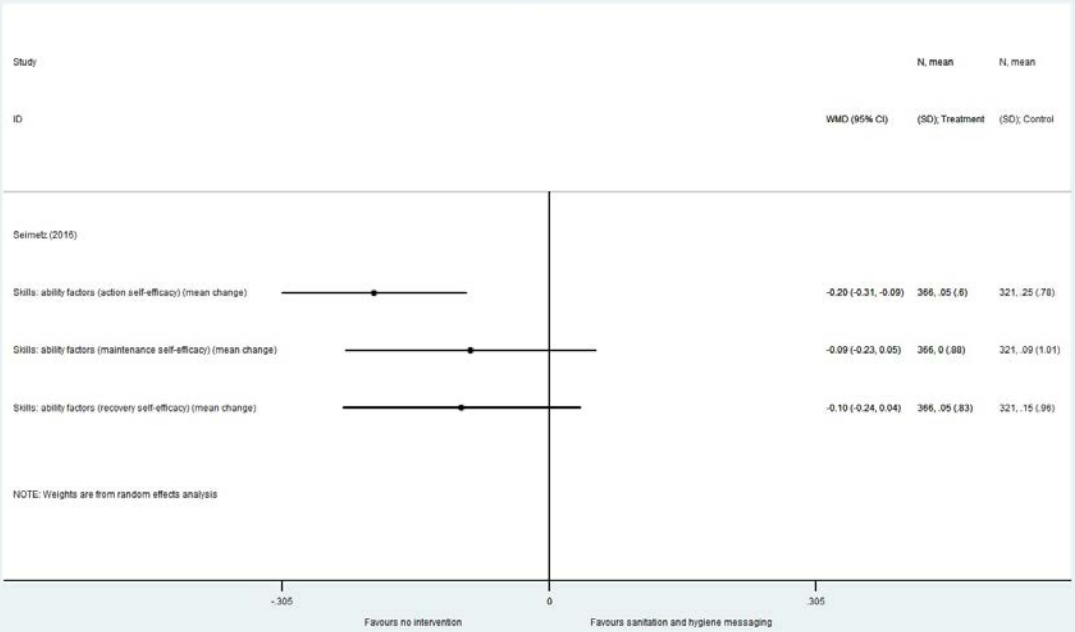




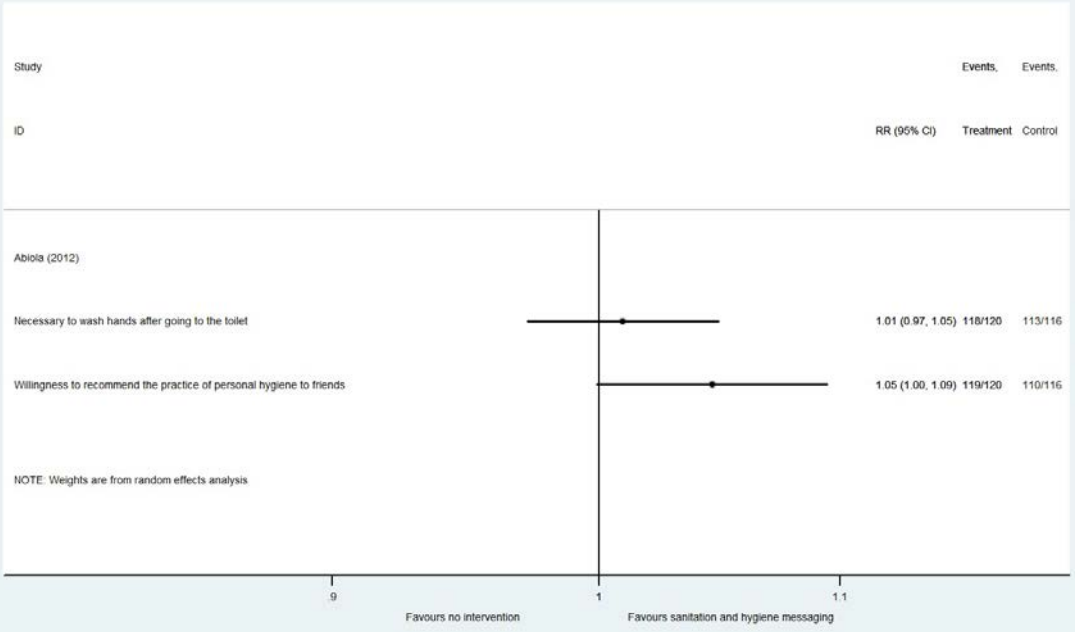
¥ One additional study measured this outcome (Mascie-Taylor 2003), but because of lack of data this study could not be added to the forest plot.

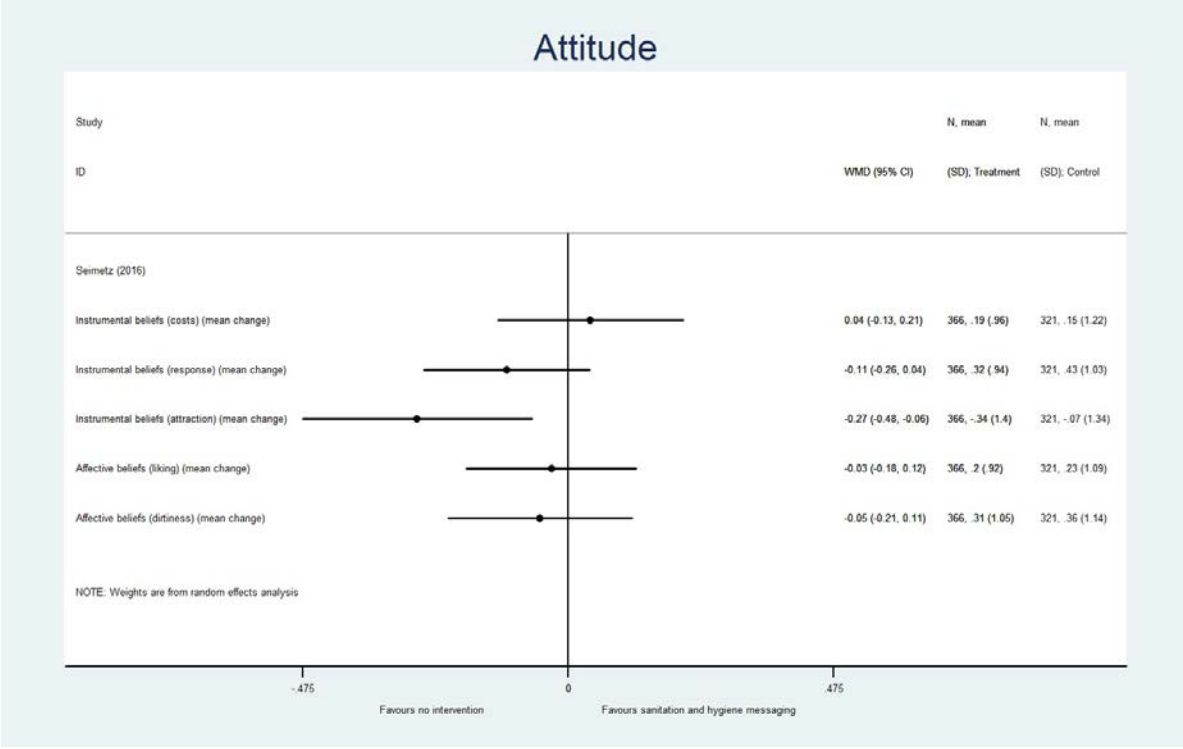


Skills

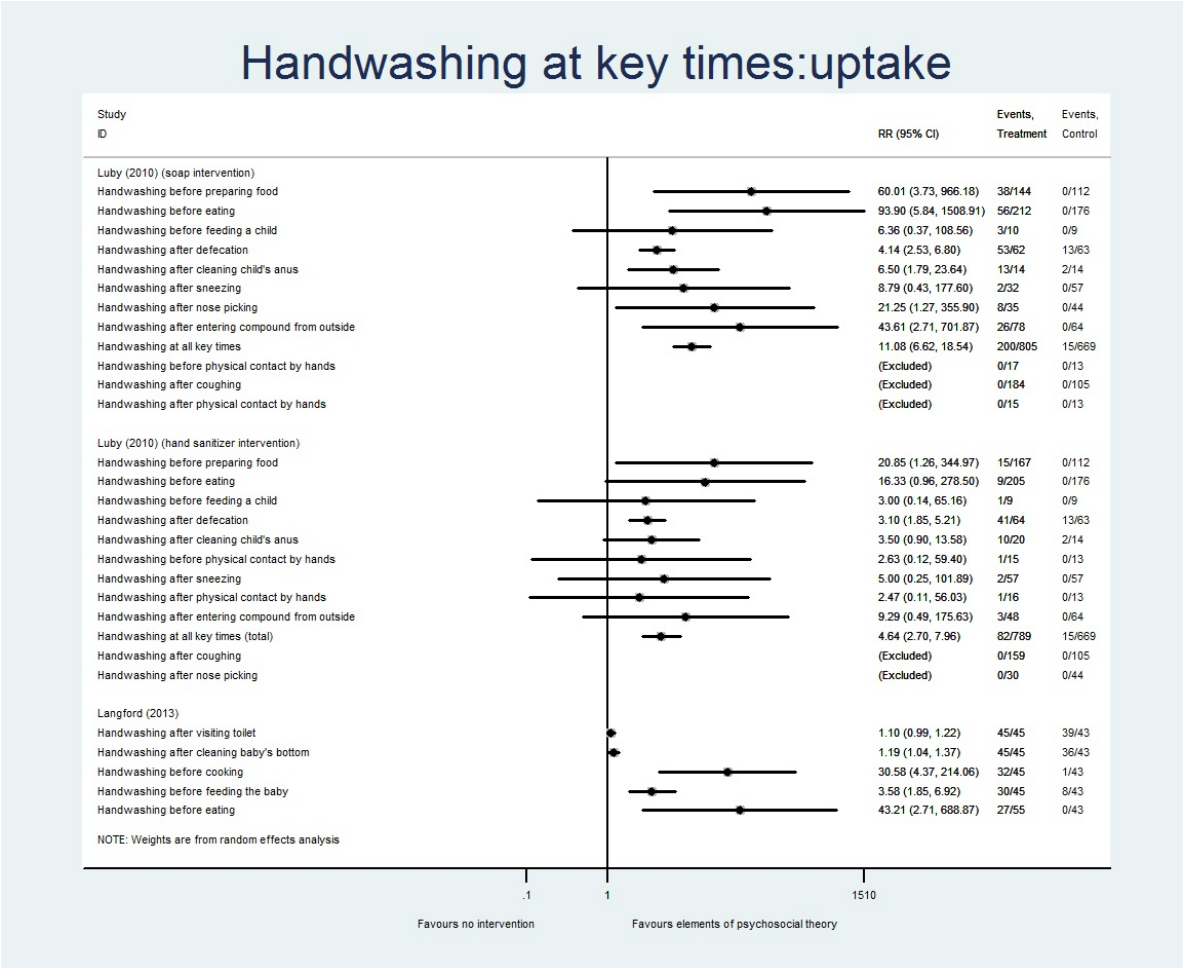


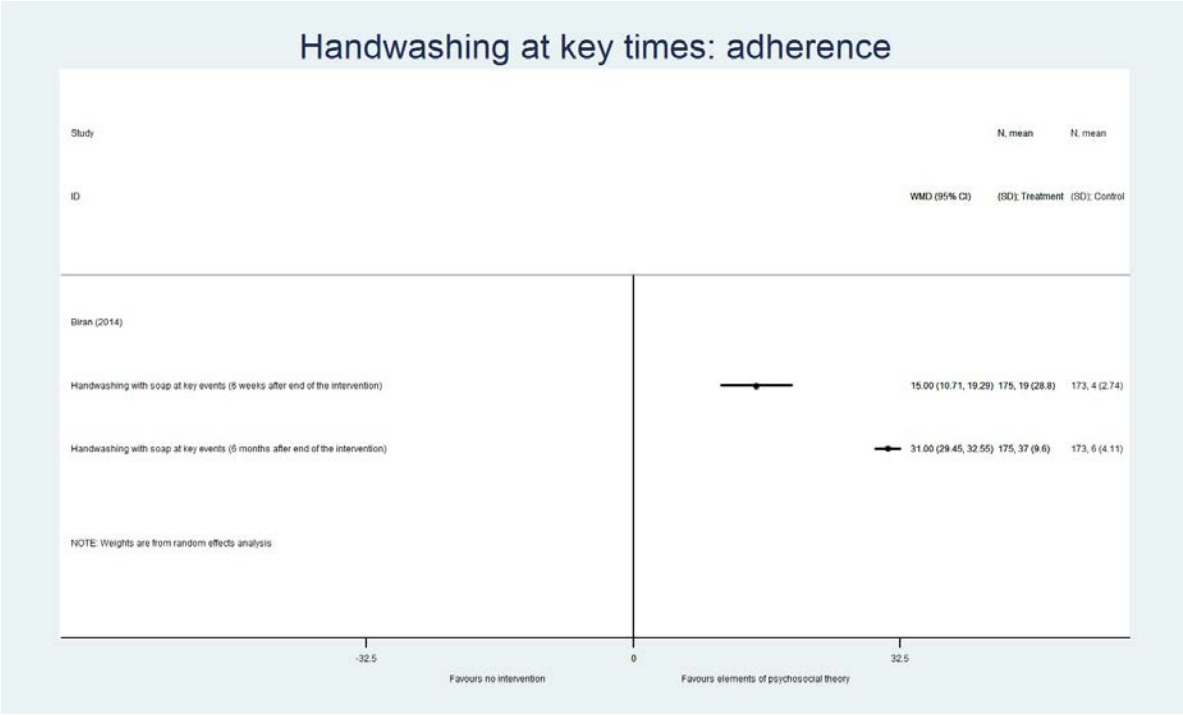
Attitudes



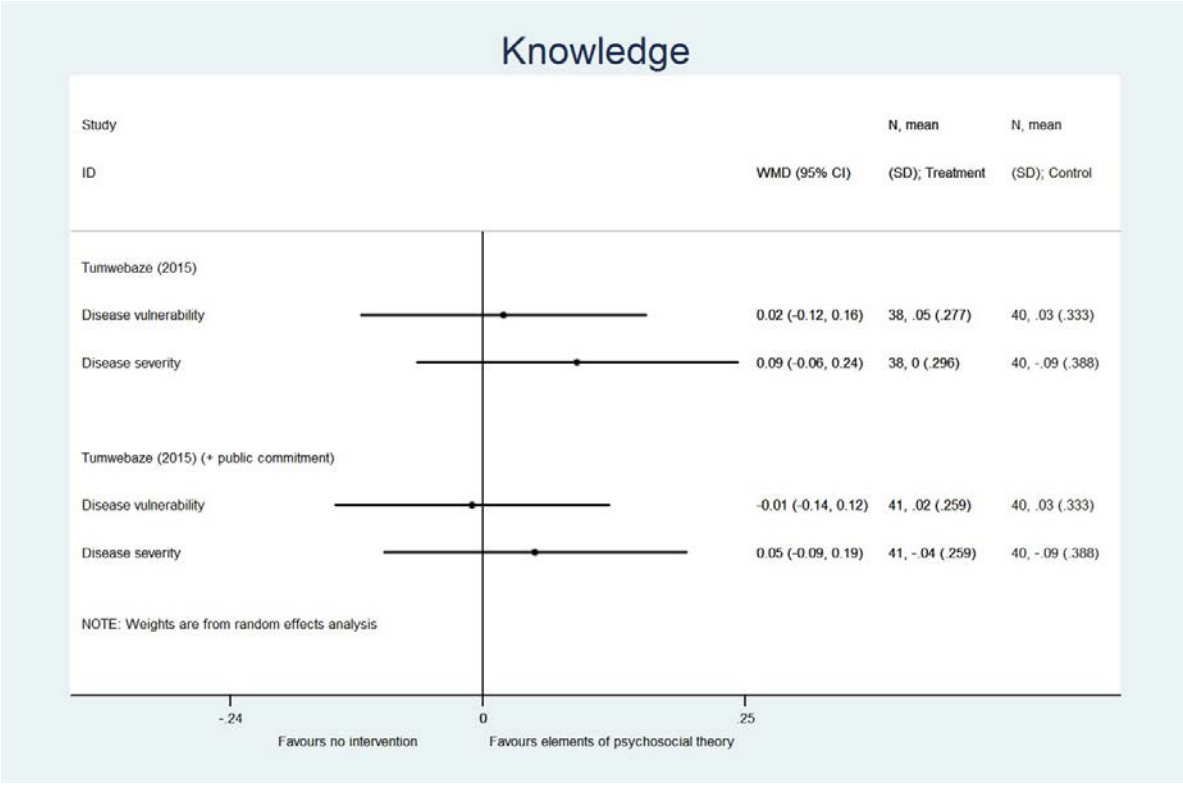


Analysis 33: Elements of psychosocial theory: Handwashing at key times

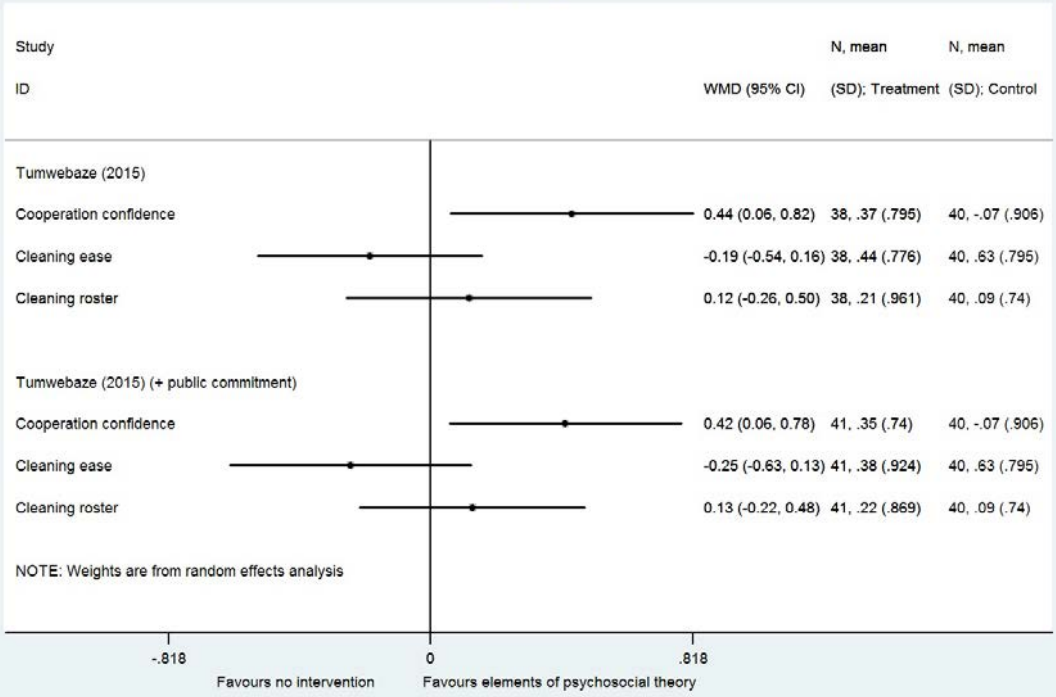




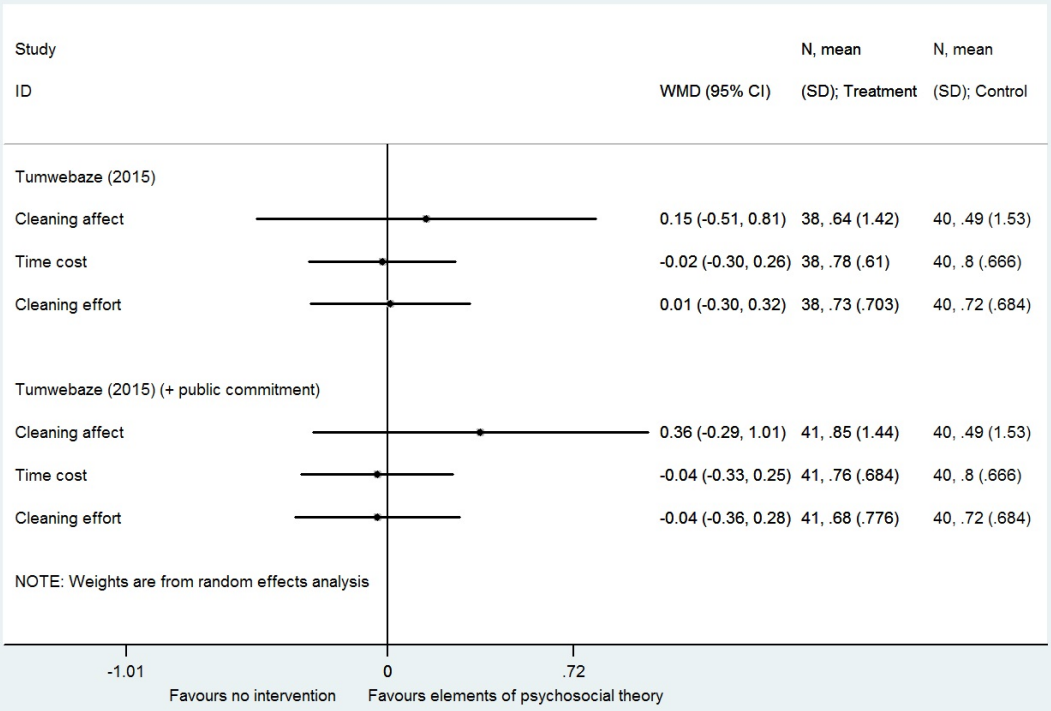
Analysis 34: Elements of psychosocial theory: Behavioural factors



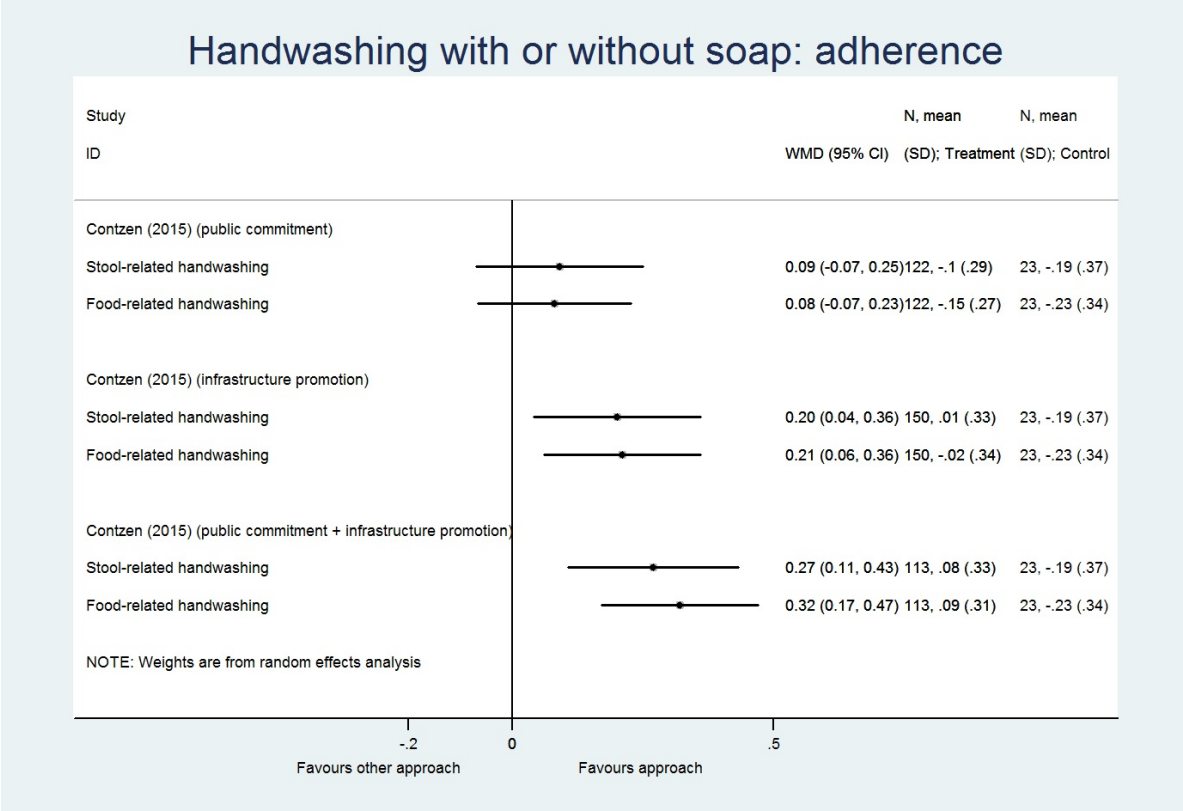
Skills



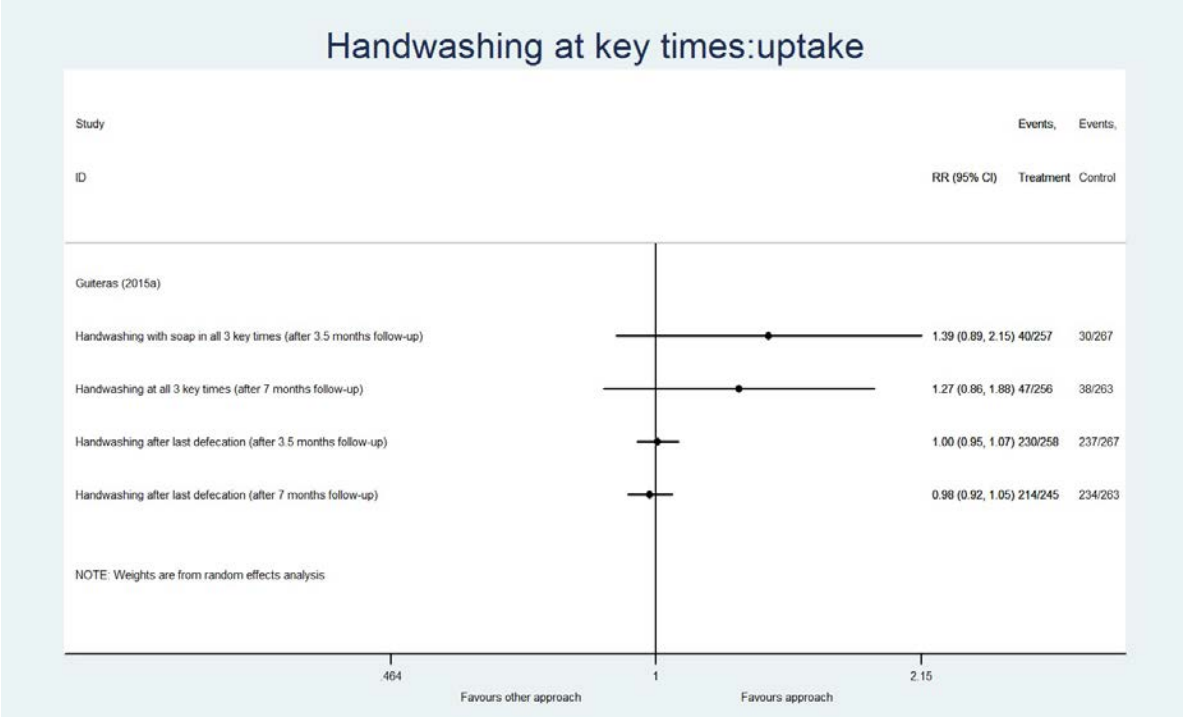
Attitude



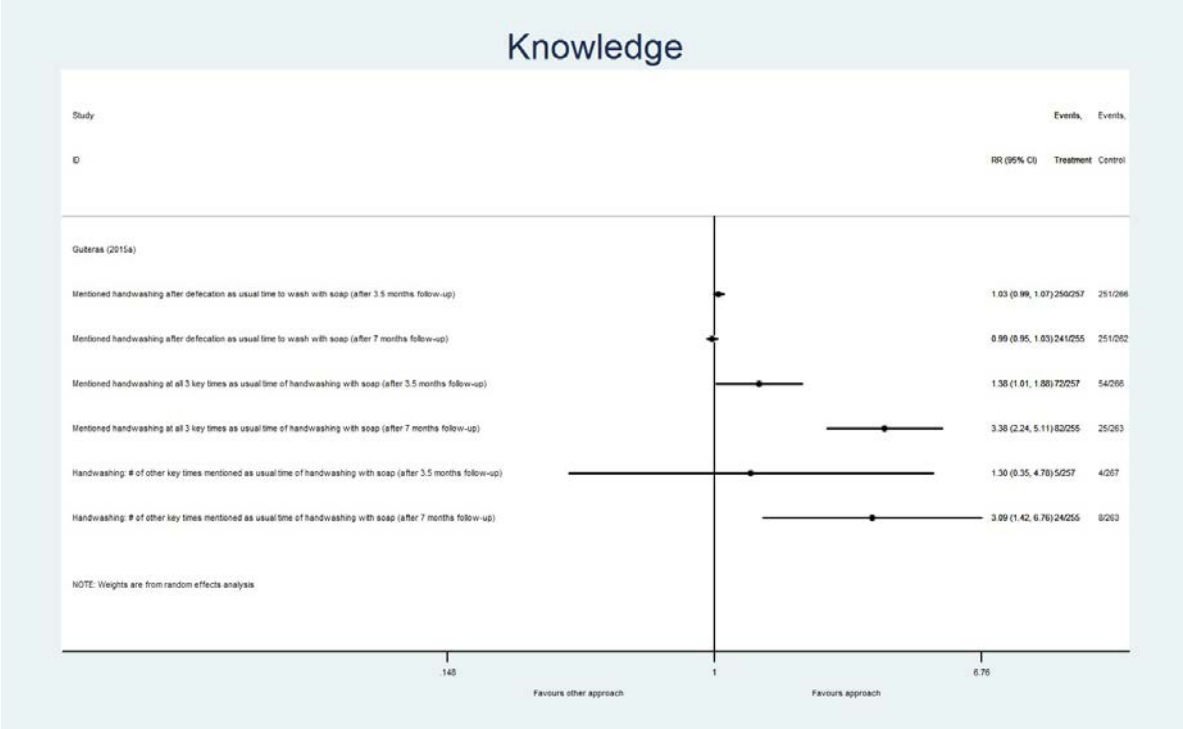
Analysis 35: Education and elements of psychosocial theory versus education alone: Handwashing with soap

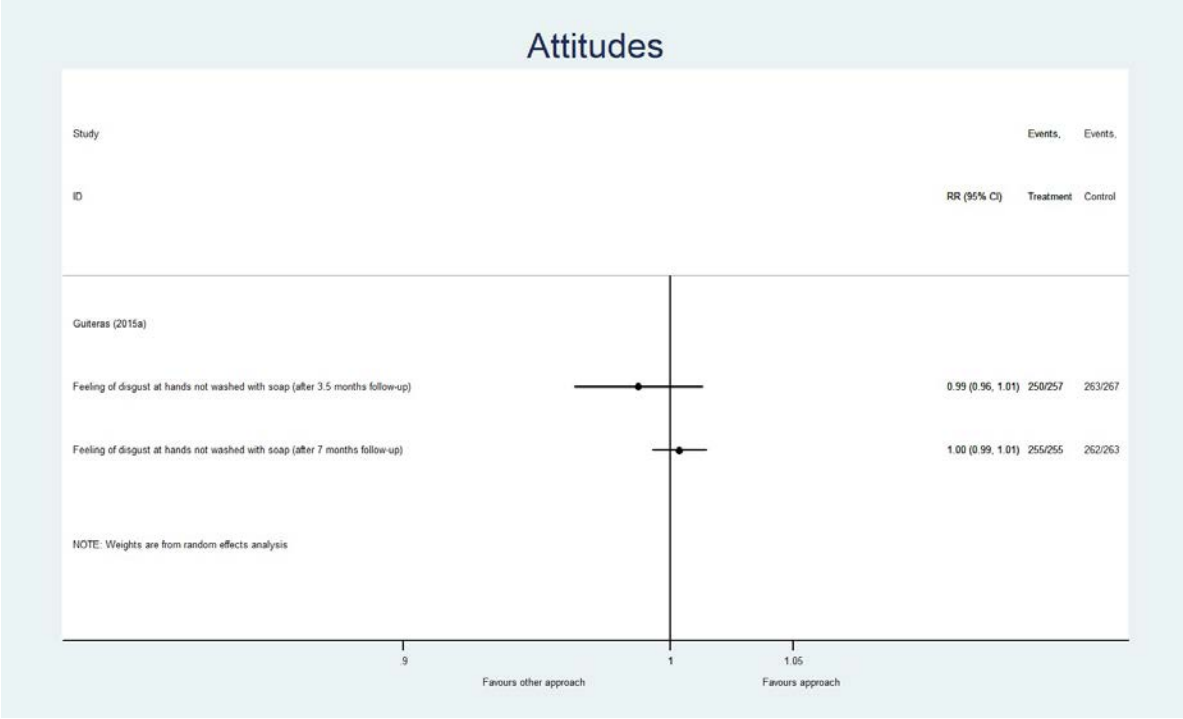


Analysis 36: Education and disgust versus education alone: Handwashing at key times

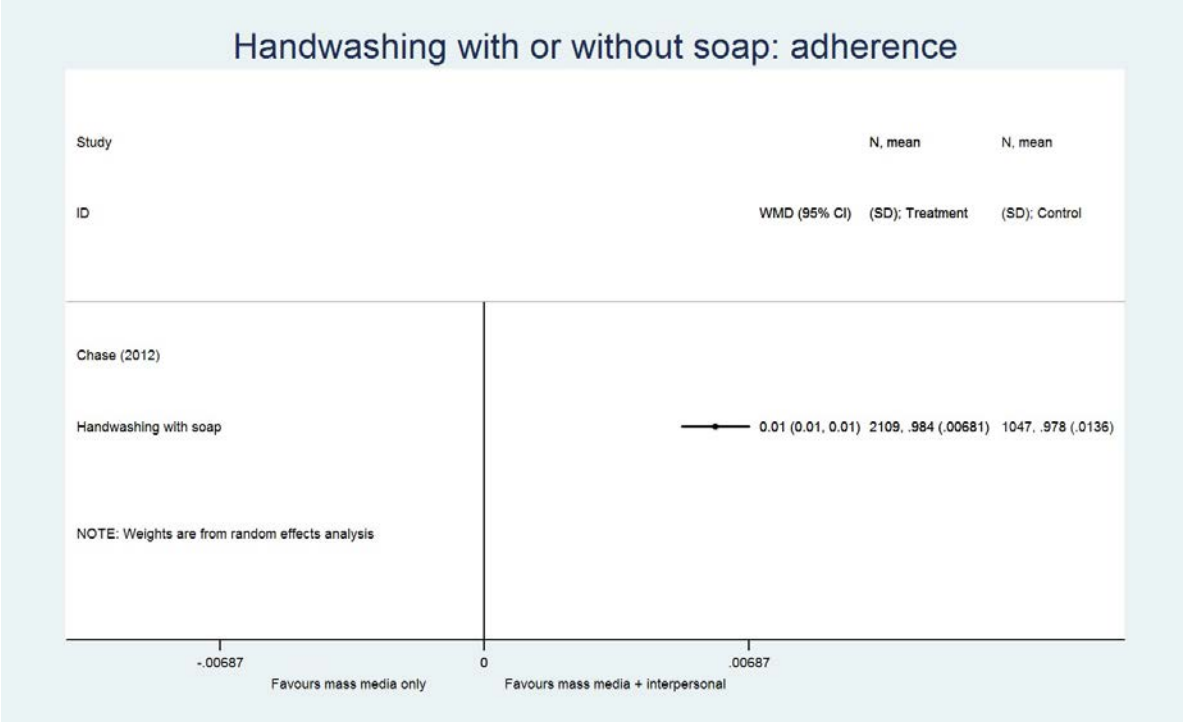


Analysis 37: Education and disgust versus education alone: Behavioural factors

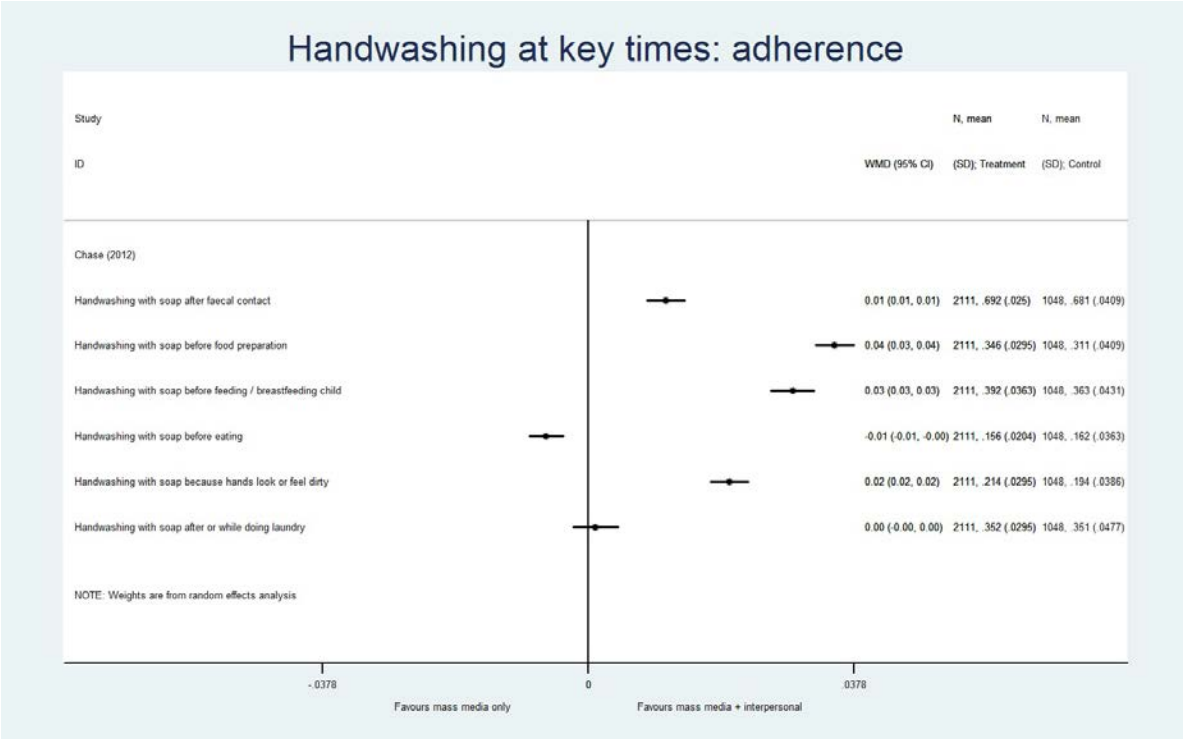




Analysis 38: Mass media and interpersonal communication versus mass media alone: Handwashing with soap

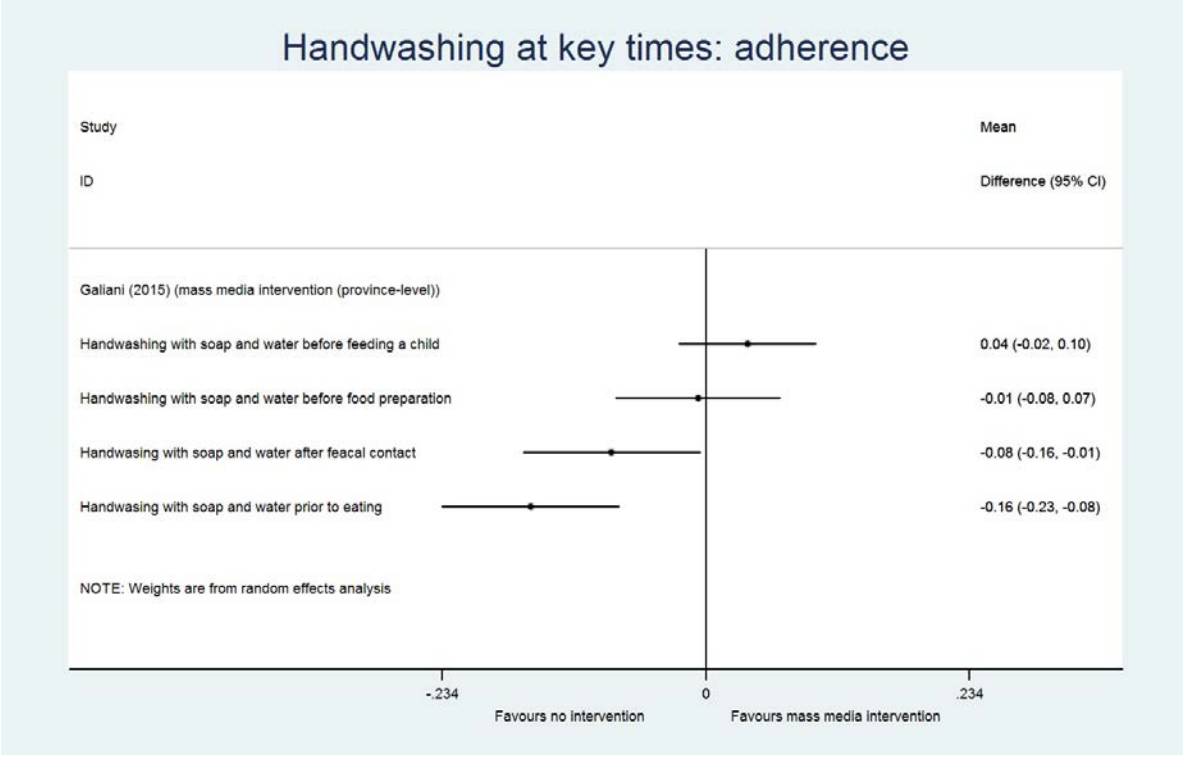


Analysis 39: Mass media and interpersonal communication: Handwashing at key times

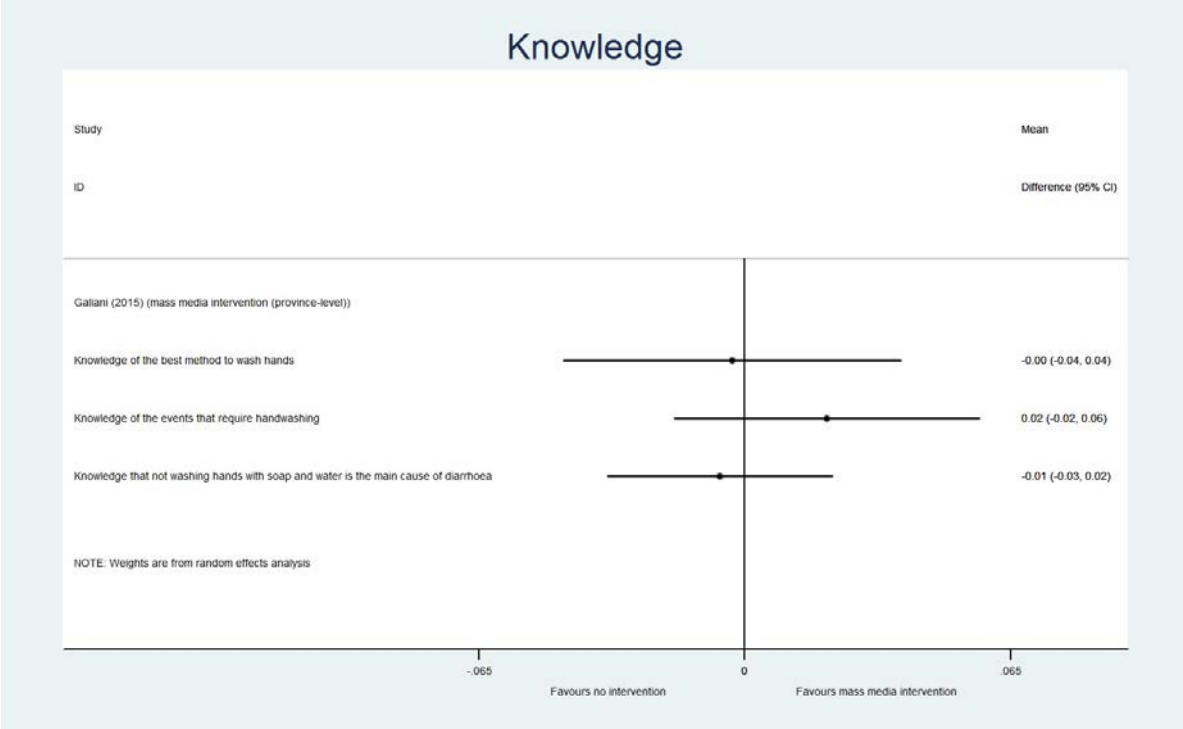


Analysis 40: Mass media and interpersonal communication versus mass media alone: Morbidity

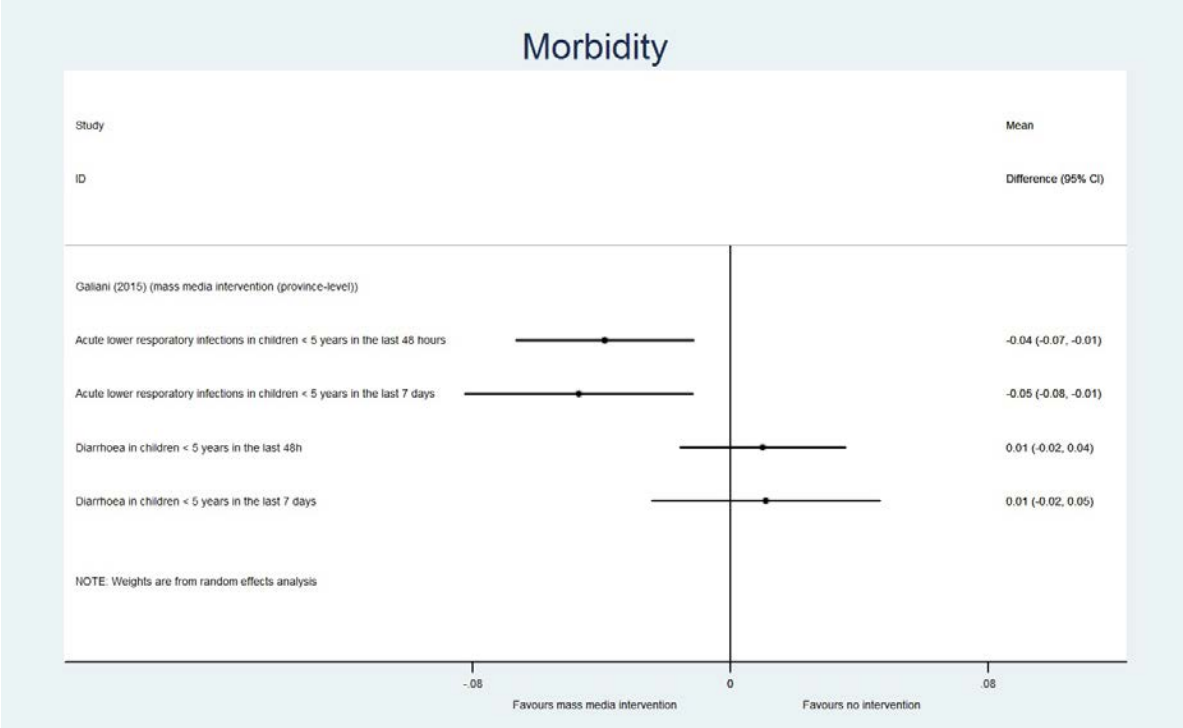
Analysis 41: Mass media and direct consumer contact versus no promotional approach: Handwashing at key times



Analysis 42: Mass media and direct consumer contact versus no promotional approach: Knowledge



Analysis 43: Mass media and direct consumer contact versus no promotional approach: Morbidity



13 Appendices

Appendix 1: Sources of information used to develop the theory of change (ToC)

The following sources of information were used to inform the ToC:

- In the scoping phase of this project (overview of existing systematic reviews), we identified a systematic review of WASH behavioural models (Dreibelbis et al., 2013). The review did not fulfill our selection criteria, but was used as a basis for the development of the ToC. The RANAS model for behaviour change, cited in this review, is one of the few models that is applicable across multiple WASH practices and interventions. RANAS stands for "Risks, Attitudes, Norms, Abilities, and Self-regulation", which are called "behavioural factors" that determine behaviour. Norms represent the perceived social pressure towards a behaviour. Self-regulation factors represent a person's attempt to plan and self-monitor a behaviour. The model is based on psychosocial theories including the Health Belief Model (Rosenstock, 1974), the Protection Motivation Theory (Floyd et al., 2000), the Health Action Process Approach (Schwarzer, 2008), the Theory of Planned Behaviour (Fishbein & Ajzen, 2010). The entire framework, containing behavioural factors and behavioural outcomes, was integrated in the ToC as short-term and intermediate outcomes, respectively. The contextual factors that are part of this model are included in a box with factors that can influence all steps of the ToC. In addition to the RANAS model, the IBM-WASH framework (standing for "The Integrated Behavioural Model for Water, Sanitation, and Hygiene") is another model providing guidance in the design and evaluation of behaviour change interventions (Dreibelbis et al., 2013). A couple of additional contextual factors (division of labour, available space) were added to the ToC. A more recent model for behaviour change that was applied in the development of handwashing programmes is the Evo-Eco approach, or BCD Behaviour Determination model (Aunger & Curtis, 2014; Aunger & Curtis, 2015). Since this model was not included in the review by Dreibelbis et al. (2013), we initially did not use it as a source of information for our ToC. However, we included a study based on this model in our systematic review, and the findings of the included studies were used to update the ToC.

- The 6 systematic reviews that were included in the scoping phase (overview of existing systematic reviews, see below) contained supportive information for certain behavioural outcomes (such as "use") and were used to develop an evidence gap map. However, due to lack of time, we were not able to extract/use the individual study data to refine the ToC or confirm any of the links in the model.

- The PROGRESS framework, which was developed to provide an equity lens into the conduct, reporting and use of research (O'Neill et al., 2014). The factors described by the PROGRESS acronym, including for example gender and disability, illuminate inequities in health and were taking into account in the phase of data synthesis in this systematic review. These factors were added to the box with "contextual factors", if they were not covered.

- The Checklist for implementation ("Ch-IMP"), which is composed of a list of process and implementation related factors, relevant in understanding aspects of intervention implementation (Cargo et al., 2015). This checklist served as a source of factors that plays a role before short-term outcomes can occur, and relevant factors were added to the ToC. In addition, the SURE framework, containing a checklist for identifying factors affecting the implementation of a policy option, was used to inform these factors and the contextual factors, if they were not covered (The SURE Collaboration, 2011).

- The draft ToC was discussed in detail and approved by our different team members, Advisory Group members, as well as methodological and content experts. A more detailed description of how stakeholder engagement resulted in an improved version of the ToC will be published elsewhere.

Appendix 2: Methods used for the overview of existing systematic reviews

In a first scoping phase (September 2015 – January 2016) an extensive overview of existing systematic reviews was performed, to answer the following research questions:

Research question 1: What is the effectiveness of approaches aiming to promote WASH behaviour change in low- and middle-income countries?

Research question 2: How do the perceptions and experiences of participants in terms of the programme's feasibility, appropriateness and meaningfulness influence WASH behaviour change?

To answer these research questions, we only included systematic reviews that investigated the effectiveness (research question 1) or implementation aspects (research question 2) of WASH promotional programmes on behavioural change outcomes. Systematic reviews where no approach was used to promote the WASH intervention and/or did not report behavioural change outcomes (e.g. only health-related outcomes), were excluded.

Different databases (The Cochrane Library, Medline (Pubmed), Embase (Ovid), Web of Science (Science citation index-expanded, Social Sciences Citation index), ERIC (EbscoHost), Cinahl (EbscoHost) and the Campbell Library) were searched from the date of inception until October 15 2015. In addition, different websites (IRC International Water and Sanitation Center, Social Science research network (SSRN), WHO, World Bank, USAID/EHPROJECT, UNICEF and International Center for Diarrhoeal Disease Research) were searched for grey literature. From 3775 database references, and 199 references identified as grey literature, 6 systematic reviews were included for data extraction and quality appraisal, including 5 reviews related to research question 1, and one review related to research question 2. We used the ROBIS tool to assess the risk of bias of the included systematic reviews (Whiting et al., 2016).

Data were analyzed narratively by setting and type of outcome (primary versus secondary). In addition, the identified systematic reviews were placed on an evidence gap map and categorized according to WASH intervention, promotional approach and type of outcome.

Appendix 3: Search strategies

1) MEDLINE (PubMed)

Search	Query
#49	Search (#48) AND #21 Filters: Publication date from 1980/01/01; Field: Title/Abstract
#21	Search (#20) AND #12 Filters: Publication date from 1980/01/01; Field: Title/Abstract
#48	Search ((((((((((#47) OR #40) OR #37) OR #34) OR #30) OR #29) OR #28) OR #26) OR #25) OR #24) OR #23) OR #22 Filters: Publication date from 1980/01/01; Field: Title/Abstract
#24	Search “low and middle income countries” OR LMIC Filters: Publication date from 1980/01/01; Field: Title/Abstract
#23	Search ((developing or “less* developed” or “ under developed” or underdeveloped or “middle income “or “low* income” or underserved or deprived or poor*) AND (countr* or nation* or population*)) Filters: Publication date from 1980/01/01; Field: Title/Abstract
#22	Search developing countries [Mesh] Filters: Publication date from 1980/01/01; Field: Title/Abstract
#28	Search Djibouti or "French Somaliland" or Dominica or "Dominican Republic" or "East Timor" or "East Timur" or "Timor Leste" or Ecuador or Egypt or "United Arab Republic" or "El Salvador" or Eritrea or Ethiopia or Fiji or Gabon or "Gabonese Republic" or Gambia or Gaza or Georgia or Georgian or Ghana or "Gold Coast" or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or "Isle of Man" or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or "Kyrgyz Republic" or Kirghiz or Kirgizstan or "Lao PDR" or Laos or Lebanon or Lesotho or Basutoland or Liberia or Libya Filters: Publication date from 1980/01/01; Field: Title/Abstract
#26	Search Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brazil or Bulgaria or "Burkina Faso" or "Burkina Fasso" or "Upper Volta" or Burundi or Urundi or Cambodia or "Khmer Republic" or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or "Cape Verde" or "Central African Republic" or Chad or Chile or China or Colombia or Comoros or "Comoro Islands" or Comores or Mayotte or Congo or Zaire or "Costa Rica" or "Cote d'Ivoire" or "Ivory Coast" or Croatia or Cuba or Cyprus Filters: Publication date from 1980/01/01; Field: Title/Abstract
#25	Search (asia or africa or south america or oceania or latin america) Filters: Publication date from 1980/01/01; Field: Title/Abstract
#29	Search Macedonia or Madagascar or "Malagasy Republic" or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or "Marshall Islands" or Mauritania or Mauritius or "Agalega Islands" or Mexico or Micronesia or "Middle East" or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or "Netherlands Antilles" or "New Caledonia" or Nicaragua or Niger or Nigeria or "Northern Mariana Islands" or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or "Puerto Rico" Filters: Publication date from 1980/01/01; Field: Title/Abstract

Search	Query
#30	Search Romania or Rumania or Roumania or Rwanda or Ruanda or "Saint Kitts" or "St Kitts" or Nevis or "Saint Lucia" or "St Lucia" or "Saint Vincent" or "St Vincent" or Grenadines or Samoa or "Samoan Islands" or "Navigator Island" or "Navigator Islands" or "Sao Tome" or "Saudi Arabia" or Senegal or Serbia or Seychelles or "Sierra Leone" or Slovenia or "Sri Lanka" or Ceylon or "Solomon Islands" or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or "Togolese Republic" or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uzbekistan or Uzbek or Vanuatu or "New Hebrides" or Venezuela or Vietnam or "Viet Nam" or "West Bank" or Yemen or Zambia or Zimbabwe Filters: Publication date from 1980/01/01; Field: Title/Abstract
#40	Search "Caribbean Region"[Mesh] Filters: Publication date from 1980/01/01; Field: Title/Abstract
#37	Search "South America"[Mesh] Filters: Publication date from 1980/01/01; Field: Title/Abstract
#34	Search "Africa"[Mesh] Filters: Publication date from 1980/01/01; Field: Title/Abstract
#47	Search (("Asia, Central"[Mesh]) OR "Asia, Western"[Mesh]) OR "Asia, Southeastern"[Mesh] Filters: Publication date from 1980/01/01; Field: Title/Abstract
#27	Search afghanistan OR albania OR algeria OR angola OR antigua OR barbuda OR argentina OR armenia OR aruba OR azerbaijan OR bahrain OR bangladesh OR barbados OR benin OR byelarus OR byelorussian OR belarus OR belorussian OR belorussia OR belize OR bhutan OR bolivia OR bosnia OR herzegovina OR hercegovina OR botswana OR brazil OR bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR burundi OR urundi OR cambodia OR "Khmer Republic" OR kampuchea OR cameroon OR cameroons OR cameron OR cameron OR "Cape Verde" OR "Central African Republic" OR chad OR chile OR china OR colombia OR comoros OR "Comoro Islands" OR comores OR mayotte OR congo OR zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR croatia OR cuba OR cyprus Filters: Publication date from 1980/01/01; Field: Title/Abstract
#20	Search (((((#19) OR #18) OR #16) OR #15) OR #14) OR #13 Filters: Publication date from 1980/01/01; Field: Title/Abstract
#12	Search (((((#4) OR #6) OR #7) OR #8) OR #10) OR #11 Filters: Publication date from 1980/01/01; Field: Title/Abstract
#13	Search Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign* Filters: Publication date from 1980/01/01; Field: Title/Abstract
#14	Search Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* or IBM-WASH OR RANAS Filters: Publication date from 1980/01/01; Field: Title/Abstract
#15	Search community-based OR participation OR participatory OR “Community Led Total Sanitation” OR CLTS OR “Participatory Rural Appraisal” OR “Participatory Hygiene and Sanitation Transformation” OR SARAR OR “community reunion*” OR “hygiene club*” OR “mother club*” OR “mothers club*” OR “health club*” OR “child-to-child” OR “Urban Led Total Sanitation” OR “community approach*” OR “Community Action Planning” OR “model home” Filters: Publication date from 1980/01/01; Field: Title/Abstract
#16	Search market* OR “market-based” OR “product design” OR “supply side improvements” or incentiv* OR subsidy OR subsidies OR voucher* OR “cash transfer*” OR microcredit OR micro-credit* OR loan* OR financ* or advocacy OR advocat* Filters: Publication date from 1980/01/01; Field: Title/Abstract

Search	Query
#18	Search “change agent*” OR “transformation agent*” OR “hygiene promotor*” OR “community leader*” OR song* OR “radio spot” OR “radio program*” OR megaphone OR “focus group*” OR cinema* OR theatr* OR television OR TV OR play* OR “hygiene day*” OR sticker* OR poster* OR billboard* OR painting* OR “home visit*” OR “mass media” OR disgust Filters: Publication date from 1980/01/01; Field: Title/Abstract
#19	Search Education[Mesh] OR “Health Knowledge, Attitudes, Practice”[Mesh] OR “health promotion”[Mesh] OR “life style”[Mesh] OR “consumer participation”[Mesh] OR “social marketing”[Mesh] OR “Health behavior”[Mesh] OR “Motivation”[Mesh] OR “Decision making” [Mesh] OR "Hygiene/education"[Mesh] OR "Information Dissemination"[Mesh] Filters: Publication date from 1980/01/01; Field: Title/Abstract
#11	Search “Hand washing” OR handwashing OR hand-washing OR “hand hygiene” OR ((hand or hands) AND wash*) Filters: Publication date from 1980/01/01; Field: Title/Abstract
#10	Search Hand* AND (clean* OR disinfect* OR sterili* OR soap OR sanitiz*) Filters: Publication date from 1980/01/01; Field: Title/Abstract
#8	Search "Hand hygiene”[Mesh] OR Hygiene[Majr] Filters: Publication date from 1980/01/01; Field: Title/Abstract
#7	Search latrine* OR toilet* OR sanitation OR lavator* OR “water closet*” Filters: Publication date from 1980/01/01; Field: Title/Abstract
#6	Search (Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR “human waste” OR “night soil” OR excreta) AND (Dispos* OR Manag*) Filters: Publication date from 1980/01/01; Field: Title/Abstract
#4	Search Sanitation[Mesh] Filters: Publication date from 1980/01/01; Field: Title/Abstract
#9	Search Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*) Filters: Publication date from 1980/01/01; Field: Title/Abstract

2) Cochrane Library

#1 (Faeces or feces or fecal or faecal or defecat* or excrement* or "human waste" or "night soil" or excreta) and (Dispos* or Manag*):ti,ab,kw or latrine* or toilet* or sanitation or lavator* or "water closet*":ti,ab,kw or Hand* and (clean* or disinfect* or sterili* or soap or treat* or sanitiz*):ti,ab,kw or "Hand washing" or handwashing or hand-washing or "hand hygiene" or ((hand or hands) and wash*):ti,ab,kw Publication Year from 1980 to 2016 (Word variations have been searched)

#2 MeSH descriptor: [Sanitation] explode all trees

#3 MeSH descriptor: [Hygiene] explode all trees

#4 MeSH descriptor: [Hand Hygiene] explode all trees

#5 #1 or #2 or #3 or #4 Publication Year from 1980 to 2016

#6 Promot* or facilitat* or motivat* or encourag* or advoca* or persua* or sustain* or behaviour* or behavior* or habit* or custom* or tendency or packag* or program* or campaign*:ti,ab,kw or Educat* or train* or lectur* or workshop* or game* or demonstrat*OR quiz* or IBM-WASH or RANAS:ti,ab,kw or community-based or participation or participatory or "Community Led Total Sanitation" or CLTS or "Participatory Rural Appraisal" or "Participatory Hygiene and Sanitation Transformation" or SARAR or "community reunion*" or "hygiene club*" or "mother club*" or "mothers club*" or "health

club*" or "child-to-child" or "Urban Led Total Sanitation" or "community approach*" or "Community Action Planning" or "model home":ti,ab,kw or market* or "market-based" or "product design" or "supply side improvements" or incentiv* or subsidy or subsidies or voucher* or "cash transfer*" or microcredit or micro-credit* or loan* or financ* or advocacy or advocat*:ti,ab,kw or "change agent*" or "transformation agent*" or "hygiene promotor*" or "community leader*" or song* or "radio spot" or "radio program*" or megaphone or "focus group*" or cinema* or theatr* or television or TV or play* or "hygiene day*" or sticker* or poster* or billboard* or painting* or "home visit*" or "mass media" or disgust:ti,ab,kw Publication Year from 1980 to 2016 (Word variations have been searched)

#7 MeSH descriptor: [Education] explode all trees

#8 MeSH descriptor: [Health Knowledge, Attitudes, Practice] explode all trees #9 MeSH descriptor: [Health Promotion] explode all trees

#10 MeSH descriptor: [Life Style] explode all trees

#11 MeSH descriptor: [Consumer Participation] explode all trees

#12 MeSH descriptor: [Social Marketing] explode all trees

#13 MeSH descriptor: [Health Behavior] explode all trees

#14 MeSH descriptor: [Motivation] explode all trees

#15 MeSH descriptor: [Decision Making] explode all trees

#16 MeSH descriptor: [Hygiene] explode all trees and with qualifier(s): [Education - ED]

#17 MeSH descriptor: [Information Dissemination] explode all trees

#18 #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 Publication Year from 1980 to 2016

#19 #5 and #18

#20 MeSH descriptor: [Developing Countries] explode all trees

#21 MeSH descriptor: [Africa] explode all trees

#22 MeSH descriptor: [South America] explode all trees

#23 MeSH descriptor: [Caribbean Region] explode all trees

#24 MeSH descriptor: [Asia, Western] explode all trees

#25 MeSH descriptor: [Asia, Central] explode all trees

#26 MeSH descriptor: [Asia, Southeastern] explode all trees

#27 ((developing or "less* developed" or " under developed" or underdeveloped or "middle income " or "low* income" or underserved or deprived or poor*) and (countr* or nation* or population*)):ti,ab,kw (Word variations have been searched)

#28 "low and middle income countries" or LMIC:ti,ab,kw (Word variations have been searched)

#29 asia or africa or south america or oceania or latin america:ti,ab,kw (Word variations have been searched)

#30 Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brazil or Bulgaria or "Burkina Faso" or "Burkina Fasso" or "Upper Volta" or Burundi or Urundi or Cambodia or "Khmer Republic" or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or "Cape Verde" or "Central

African Republic" or Chad or Chile or China or Colombia or Comoros or "Comoro Islands" or Comores or Mayotte or Congo or Zaire or "Costa Rica" or "Cote d'Ivoire" or "Ivory Coast" or Croatia or Cuba or Cyprus:ti,ab,kw (Word variations have been searched)

#31 Djibouti or "French Somaliland" or Dominica or "Dominican Republic" or "East Timor" or "East Timur" or "Timor Leste" or Ecuador or Egypt or "United Arab Republic" or "El Salvador" or Eritrea or Ethiopia or Fiji or Gabon or "Gabonese Republic" or Gambia or Gaza or Georgia or Georgian or Ghana or "Gold Coast" or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or "Isle of Man" or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or "Kyrgyz Republic" or Kirghiz or Kirgizstan or "Lao PDR" or Laos or Lebanon or Lesotho or Basutoland or Liberia or Libya:ti,ab,kw (Word variations have been searched)

#32 Macedonia or Madagascar or "Malagasy Republic" or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or "Marshall Islands" or Mauritania or Mauritius or "Agalega Islands" or Mexico or Micronesia or "Middle East" or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or "Netherlands Antilles" or "New Caledonia" or Nicaragua or Niger or Nigeria or "Northern Mariana Islands" or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or "Puerto Rico":ti,ab,kw (Word variations have been searched)

#33 Romania or Rumania or Roumania or Rwanda or Ruanda or "Saint Kitts" or "St Kitts" or Nevis or "Saint Lucia" or "St Lucia" or "Saint Vincent" or "St Vincent" or Grenadines or Samoa or "Samoan Islands" or "Navigator Island" or "Navigator Islands" or "Sao Tome" or "Saudi Arabia" or Senegal or Serbia or Seychelles or "Sierra Leone" or Slovenia or "Sri Lanka" or Ceylon or "Solomon Islands" or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or "Togolese Republic" or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uzbekistan or Uzbek or Vanuatu or "New Hebrides" or Venezuela or Vietnam or "Viet Nam" or "West Bank" or Yemen or Zambia or Zimbabwe:ti,ab,kw (Word variations have been searched)

#34 #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 Publication Year from 1980 to 2016

#35 #19 and #34

3) Applied Social Sciences Index and Abstracts (ASSIA)

S1 ab((Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR "human waste" OR "night soil" OR excreta) AND (Dispos* OR Manag*)) OR ti((Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR "human waste" OR "night soil" OR excreta) AND (Dispos* OR Manag*)) AND pd(>19800101)

S2 ab(latrine* OR toilet* OR sanitation OR lavator* OR "water closet*") OR ti(latrine* OR toilet* OR sanitation OR lavator* OR "water closet*") AND pd(>19800101)

S3 ab(Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*)) OR ti(Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*)) AND pd(>19800101)

S4 ab("Hand washing" OR handwashing OR hand-washing OR "hand hygiene" OR ((hand OR hands) AND wash*)) OR ti("Hand washing" OR handwashing OR hand-washing OR "hand hygiene" OR ((hand OR hands) AND wash*)) AND pd(>19800101)

S5 su(sanitation OR hygiene) OR su(sanitation OR hygiene) AND pd(>19800101)

S6 (ab((Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR "human waste" OR "night soil" OR excreta) AND (Dispos* OR Manag*)) OR ti((Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR "human waste" OR "night soil" OR excreta) AND (Dispos* OR Manag*)) AND pd(>19800101)) OR (ab(latrine* OR toilet* OR sanitation OR lavator* OR "water closet*") OR ti(latrine* OR toilet* OR sanitation OR lavator* OR "water closet*") AND pd(>19800101)) OR (ab(Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*)) OR ti(Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*)) AND pd(>19800101)) OR (ab("Hand washing" OR handwashing OR hand-washing OR "hand hygiene" OR ((hand OR hands) AND wash*)) OR ti("Hand washing" OR handwashing OR hand-washing OR "hand hygiene" OR ((hand OR hands) AND wash*)) AND pd(>19800101)) OR (su(sanitation OR hygiene) OR su(sanitation OR hygiene) AND pd(>19800101))

S7 su(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR su(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) AND pd(>19800101)

S8 ti(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR ab(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) AND pd(>19800101)

S9 ti(Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* OR IBM-WASH OR RANAS) OR ab(Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* OR IBM-WASH OR RANAS) AND pd(>19800101)

S10 ti(community-based OR participation OR participatory OR "Community Led Total Sanitation" OR CLTS OR "Participatory Rural Appraisal" OR "Participatory Hygiene and Sanitation Transformation" OR SARAR OR "community reunion*" OR "hygiene club*" OR "mother club*" OR "mothers club*" OR "health club*" OR "child-to-child" OR "Urban Led Total Sanitation" OR "community approach*" OR "Community Action Planning" OR "model home" :ti,ab,kw OR market* OR "market-based" OR "product design" OR "supply side improvements" OR incentiv* OR subsidy OR subsidies OR voucher* OR "cash transfer*" OR microcredit OR

micro-credit* OR loan* OR financ* OR advocacy OR advocat*) OR ab(community-based OR participation OR participatory OR "Community Led Total Sanitation" OR CLTS OR "Participatory Rural Appraisal" OR "Participatory Hygiene and Sanitation Transformation" OR SARAR OR "community reunion*" OR "hygiene club*" OR "mother club*" OR "mothers club*" OR "health club*" OR "child-to-child" OR "Urban Led Total Sanitation" OR "community approach*" OR "Community Action Planning" OR "model home" :ti,ab,kw OR market* OR "market-based" OR "product design" OR "supply side improvements" OR incentiv* OR subsidy OR subsidies OR voucher* OR "cash transfer*" OR microcredit OR micro-credit* OR loan* OR financ* OR advocacy OR advocat*) AND pd(>19800101)

S11 ti("change agent*" OR "transformation agent*" OR "hygiene promotor*" OR "community leader*" OR song* OR "radio spot" OR "radio program*" OR megaphone OR "focus group*" OR cinema* OR theatr* OR television OR TV OR play* OR "hygiene day*" OR sticker* OR poster* OR billboard* OR painting* OR "home visit*" OR "mass media" OR disgust) OR ab("change agent*" OR "transformation agent*" OR "hygiene promotor*" OR "community leader*" OR song* OR "radio spot" OR "radio program*" OR megaphone OR "focus group*" OR cinema* OR theatr* OR television OR TV OR play* OR "hygiene day*" OR sticker* OR poster* OR billboard* OR painting* OR "home visit*" OR "mass media" OR disgust) AND pd(>19800101)

S12 su(education OR motivation OR "consumer participation" OR "health behaviour" OR "social marketing" OR "decision making") OR su(education OR motivation OR "consumer participation" OR "health behaviour" OR "social marketing" OR "decision making") AND pd(>19800101)

S13 (su(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR su(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) AND pd(>19800101)) OR (ti(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR ab(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) AND pd(>19800101)) OR (ti(Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* OR IBM-WASH OR RANAS) OR ab(Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* OR IBM-WASH OR RANAS) AND pd(>19800101)) OR (ti(community-based OR participation OR participatory OR "Community Led Total Sanitation" OR CLTS OR "Participatory Rural Appraisal" OR "Participatory Hygiene and Sanitation Transformation" OR SARAR OR "community reunion*" OR "hygiene club*" OR "mother club*" OR "mothers club*" OR "health club*" OR "child-to-child" OR "Urban Led Total Sanitation" OR "community approach*" OR "Community Action Planning" OR "model home" :ti,ab,kw OR market* OR "market-based" OR "product design" OR "supply side improvements" OR incentiv* OR subsidy OR subsidies OR voucher* OR "cash transfer*" OR microcredit OR micro-credit* OR loan* OR financ* OR advocacy OR advocat*) OR ab(community-based OR participation OR participatory OR "Community Led Total Sanitation" OR CLTS OR "Participatory Rural Appraisal" OR

"Participatory Hygiene and Sanitation Transformation" OR SARAR OR "community reunion*" OR "hygiene club*" OR "mother club*" OR "mothers club*" OR "health club*" OR "child-to-child" OR "Urban Led Total Sanitation" OR "community approach*" OR "Community Action Planning" OR "model home" :ti,ab,kw OR market* OR "market-based" OR "product design" OR "supply side improvements" OR incentiv* OR subsidy OR subsidies OR voucher* OR "cash transfer*" OR microcredit OR micro-credit* OR loan* OR financ* OR advocacy OR advocat*) AND pd(>19800101)) OR (ti("change agent*" OR "transformation agent*" OR "hygiene promotor*" OR "community leader*" OR song* OR "radio spot" OR "radio program*" OR megaphone OR "focus group*" OR cinema* OR theatr* OR television OR TV OR play* OR "hygiene day*" OR sticker* OR poster* OR billboard* OR painting* OR "home visit*" OR "mass media" OR disgust) OR ab("change agent*" OR "transformation agent*" OR "hygiene promotor*" OR "community leader*" OR song* OR "radio spot" OR "radio program*" OR megaphone OR "focus group*" OR cinema* OR theatr* OR television OR TV OR play* OR "hygiene day*" OR sticker* OR poster* OR billboard* OR painting* OR "home visit*" OR "mass media" OR disgust) AND pd(>19800101)) OR (su(education OR motivation OR "consumer participation" OR "health behaviour" OR "social marketing" OR "decision making") OR su(education OR motivation OR "consumer participation" OR "health behaviour" OR "social marketing" OR "decision making") AND pd(>19800101))

S14 ((su(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR su(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) AND pd(>19800101)) OR (ti(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR ab(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) AND pd(>19800101)) OR (ti(Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* OR IBM-WASH OR RANAS) OR ab(Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* OR IBM-WASH OR RANAS) AND pd(>19800101)) OR (ti(community-based OR participation OR participatory OR "Community Led Total Sanitation" OR CLTS OR "Participatory Rural Appraisal" OR "Participatory Hygiene and Sanitation Transformation" OR SARAR OR "community reunion*" OR "hygiene club*" OR "mother club*" OR "mothers club*" OR "health club*" OR "child-to-child" OR "Urban Led Total Sanitation" OR "community approach*" OR "Community Action Planning" OR "model home" :ti,ab,kw OR market* OR "market-based" OR "product design" OR "supply side improvements" OR incentiv* OR subsidy OR subsidies OR voucher* OR "cash transfer*" OR microcredit OR micro-credit* OR loan* OR financ* OR advocacy OR advocat*) OR ab(community-based OR participation OR participatory OR "Community Led Total Sanitation" OR CLTS OR "Participatory Rural Appraisal" OR "Participatory Hygiene and Sanitation Transformation" OR SARAR OR "community reunion*" OR "hygiene club*" OR "mother club*" OR "mothers club*" OR "health club*" OR "child-to-child" OR "Urban Led Total Sanitation" OR "community approach*" OR "Community Action Planning" OR "model home" :ti,ab,kw OR market* OR "market-based" OR "product design" OR "supply side improvements" OR incentiv* OR subsidy OR subsidies OR voucher* OR "cash transfer*" OR

microcredit OR micro-credit* OR loan* OR financ* OR advocacy OR advocat*) AND pd(>19800101)) OR (ti("change agent*" OR "transformation agent*" OR "hygiene promotor*" OR "community leader*" OR song* OR "radio spot" OR "radio program*" OR megaphone OR "focus group*" OR cinema* OR theatr* OR television OR TV OR play* OR "hygiene day*" OR sticker* OR poster* OR billboard* OR painting* OR "home visit*" OR "mass media" OR disgust) OR ab("change agent*" OR "transformation agent*" OR "hygiene promotor*" OR "community leader*" OR song* OR "radio spot" OR "radio program*" OR megaphone OR "focus group*" OR cinema* OR theatr* OR television OR TV OR play* OR "hygiene day*" OR sticker* OR poster* OR billboard* OR painting* OR "home visit*" OR "mass media" OR disgust) AND pd(>19800101)) OR (su(education OR motivation OR "consumer participation" OR "health behaviour" OR "social marketing" OR "decision making") OR su(education OR motivation OR "consumer participation" OR "health behaviour" OR "social marketing" OR "decision making") AND pd(>19800101))) AND ((ab((Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR "human waste" OR "night soil" OR excreta) AND (Dispos* OR Manag*)) OR ti((Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR "human waste" OR "night soil" OR excreta) AND (Dispos* OR Manag*)) AND pd(>19800101)) OR (ab(latrine* OR toilet* OR sanitation OR lavator* OR "water closet*") OR ti(latrine* OR toilet* OR sanitation OR lavator* OR "water closet*") AND pd(>19800101)) OR (ab(Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*)) OR ti(Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*)) AND pd(>19800101)) OR (ab("Hand washing" OR handwashing OR hand-washing OR "hand hygiene" OR ((hand OR hands) AND wash*)) OR ti("Hand washing" OR handwashing OR hand-washing OR "hand hygiene" OR ((hand OR hands) AND wash*)) AND pd(>19800101)) OR (su(sanitation OR hygiene) OR su(sanitation OR hygiene) AND pd(>19800101)))

S15 su((developing OR "less* developed" OR " under developed" OR underdeveloped OR "middle income " OR "low* income" OR underserved OR deprived OR poor*) AND (countr* OR nation* OR population*)) OR pub((developing OR "less* developed" OR " under developed" OR underdeveloped OR "middle income " OR "low* income" OR underserved OR deprived OR poor*) AND (countr* OR nation* OR population*)) OR ab((developing OR "less* developed" OR " under developed" OR underdeveloped OR "middle income " OR "low* income" OR underserved OR deprived OR poor*) AND (countr* OR nation* OR population*)) AND pd(>19800101)

S16 su(asia OR africa OR south america OR oceania OR latin america) OR pub(asia OR africa OR south america OR oceania OR latin america) OR ab(asia OR africa OR south america OR oceania OR latin america) AND pd(>19800101)

S17 su(r Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus) OR pub(r Aruba OR Azerbaijan OR

Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus) OR ab(r Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus) AND pd(>19800101)

S18 su(Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya) OR pub(Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya) OR ab(Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya) AND pd(>19800101)

S19 su(Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico") OR pub(Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico") OR ab(Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico") AND pd(>19800101)

S20 su(Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe) OR pub(Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR

Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe) OR ab(Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe) AND pd(>19800101)

S21 (su((developing OR "less* developed" OR " under developed" OR underdeveloped OR "middle income " OR "low* income" OR underserved OR deprived OR poor*) AND (countr* OR nation* OR population*)) OR pub((developing OR "less* developed" OR " under developed" OR underdeveloped OR "middle income " OR "low* income" OR underserved OR deprived OR poor*) AND (countr* OR nation* OR population*)) OR ab((developing OR "less* developed" OR " under developed" OR underdeveloped OR "middle income " OR "low* income" OR underserved OR deprived OR poor*) AND (countr* OR nation* OR population*)) AND pd(>19800101)) OR (su(asia OR africa OR south america OR oceania OR latin america) OR pub(asia OR africa OR south america OR oceania OR latin america) OR ab(asia OR africa OR south america OR oceania OR latin america) AND pd(>19800101)) OR (su(r Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus) OR pub(r Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus) OR ab(r Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR

"Ivory Coast" OR Croatia OR Cuba OR Cyprus) AND pd(>19800101)) OR (su(Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya) OR pub(Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya) OR ab(Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya) AND pd(>19800101)) OR (su(Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico") OR pub(Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico") OR ab(Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR

Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico") AND pd(>19800101)) OR (su(Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe) OR pub(Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe) OR ab(Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe) AND pd(>19800101))

S22 ((su((developing OR "less* developed" OR " under developed" OR underdeveloped OR "middle income " OR "low* income" OR underserved OR deprived OR poor*) AND (countr* OR nation* OR population*)) OR pub((developing OR "less* developed" OR " under developed" OR underdeveloped OR "middle income " OR "low* income" OR underserved OR deprived OR poor*) AND (countr* OR nation* OR population*)) OR ab((developing OR "less* developed" OR " under developed" OR underdeveloped OR "middle income " OR "low* income" OR underserved OR deprived OR poor*) AND (countr* OR nation* OR population*)) AND pd(>19800101)) OR (su(asia OR africa OR south america OR oceania OR latin america) OR pub(asia OR africa OR

south america OR oceania OR latin america) OR ab(asia OR africa OR south america OR oceania OR latin america) AND pd(>19800101)) OR (su(r Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus) OR pub(r Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus) OR ab(r Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus) AND pd(>19800101)) OR (su(Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya) OR pub(Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya) OR ab(Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon

OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya) AND pd(>19800101)) OR (su(Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico") OR pub(Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico") OR ab(Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR "Puerto Rico") AND pd(>19800101)) OR (su(Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe) OR pub(Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR

Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe) OR ab(Romania OR Rumania OR Roumania OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Zambia OR Zimbabwe) AND pd(>19800101))) AND (((su(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR su(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) AND pd(>19800101)) OR (ti(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR ab(Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) AND pd(>19800101)) OR (ti(Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* OR IBM-WASH OR RANAS) OR ab(Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* OR IBM-WASH OR RANAS) AND pd(>19800101)) OR (ti(community-based OR participation OR participatory OR "Community Led Total Sanitation" OR CLTS OR "Participatory Rural Appraisal" OR "Participatory Hygiene and Sanitation Transformation" OR SARAR OR "community reunion*" OR "hygiene club*" OR "mother club*" OR "mothers club*" OR "health club*" OR "child-to-child" OR "Urban Led Total Sanitation" OR "community approach*" OR "Community Action Planning" OR "model home" :ti,ab,kw OR market* OR "market-based" OR "product design" OR "supply side improvements" OR incentiv* OR subsidy OR subsidies OR voucher* OR "cash transfer*" OR microcredit OR micro-credit* OR loan* OR financ* OR advocacy OR advocat*) OR ab(community-based OR participation OR participatory OR "Community Led Total Sanitation" OR CLTS OR "Participatory Rural Appraisal" OR "Participatory Hygiene and Sanitation Transformation" OR SARAR OR "community reunion*" OR "hygiene club*" OR "mother club*" OR "mothers club*" OR "health club*" OR "child-to-child" OR "Urban Led Total Sanitation" OR "community approach*" OR "Community Action Planning" OR "model home" :ti,ab,kw OR market* OR "market-based" OR "product design" OR "supply side improvements" OR incentiv* OR subsidy OR subsidies OR voucher* OR "cash transfer*" OR microcredit OR micro-credit* OR loan* OR financ* OR advocacy OR advocat*) AND pd(>19800101)) OR (ti("change agent*" OR "transformation agent*" OR "hygiene promotor*" OR "community leader*" OR song* OR "radio spot" OR "radio program*" OR megaphone OR "focus

group*" OR cinema* OR theatr* OR television OR TV OR play* OR "hygiene day*" OR sticker* OR poster* OR billboard* OR painting* OR "home visit*" OR "mass media" OR disgust) OR ab("change agent*" OR "transformation agent*" OR "hygiene promotor*" OR "community leader*" OR song* OR "radio spot" OR "radio program*" OR megaphone OR "focus group*" OR cinema* OR theatr* OR television OR TV OR play* OR "hygiene day*" OR sticker* OR poster* OR billboard* OR painting* OR "home visit*" OR "mass media" OR disgust) AND pd(>19800101)) OR (su(education OR motivation OR "consumer participation" OR "health behaviour" OR "social marketing" OR "decision making") OR su(education OR motivation OR "consumer participation" OR "health behaviour" OR "social marketing" OR "decision making") AND pd(>19800101))) AND ((ab((Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR "human waste" OR "night soil" OR excreta) AND (Dispos* OR Manag*)) OR ti((Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR "human waste" OR "night soil" OR excreta) AND (Dispos* OR Manag*)) AND pd(>19800101)) OR (ab(latrine* OR toilet* OR sanitation OR lavator* OR "water closet*") OR ti(latrine* OR toilet* OR sanitation OR lavator* OR "water closet*") AND pd(>19800101)) OR (ab(Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*)) OR ti(Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*)) AND pd(>19800101)) OR (ab("Hand washing" OR handwashing OR hand-washing OR "hand hygiene" OR ((hand OR hands) AND wash*)) OR ti("Hand washing" OR handwashing OR hand-washing OR "hand hygiene" OR ((hand OR hands) AND wash*)) AND pd(>19800101)) OR (su(sanitation OR hygiene) OR su(sanitation OR hygiene) AND pd(>19800101))))

4) Global Health, Global Index Medicus (CABI)

1st search

tw:((mj:(sanitation OR hygiene OR handwashing)) AND (tw:(promotion OR education OR participation OR incentives))) AND (instance:"ghl") AND (db:("LILACS" OR "WHOLIS" OR "WPRIM" OR "AIM" OR "IMEMR") AND mj:("Sanitation" OR "Hygiene" OR "Health Education" OR "Water Supply" OR "Consumer Participation" OR "Health Promotion" OR "Hand Disinfection" OR "Education"))

2nd search

(tw:(sanitation OR hygiene OR handwashing OR (human waste))) AND (tw:(promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*)) AND (instance:"ghl") AND (db:("LILACS" OR "WHOLIS" OR "WPRIM" OR "AIM" OR "IMEMR") AND mj:("Health Promotion" OR "Hygiene" OR "Sanitation" OR "Health Surveillance" OR "Consumer Participation" OR "Health Policy" OR "Life Style" OR "Public Health"))

5) EMBASE (OVID)

1 ((Faeces or feces or fecal or faecal or defecat* or excrement* or "human waste" or "night soil" or excreta) and (Dispos* or Manag*)).ab. or ((Faeces or feces or fecal or faecal or

defecat* or excrement* or "human waste" or "night soil" or excreta) and (Dispos* or Manag*)).ti.
2 (latrine* or toilet* or sanitation or lavator* or "water closet*").ab. or (latrine* or toilet* or sanitation or lavator* or "water closet*").ti.
3 sanitation/
4 hand hygiene.mp. or hand washing/
5 hygiene/
6 (Hand* adj3 (clean* or disinfect* or sterili* or soap or treat* or sanitiz*)).ab. or (Hand* adj3 (clean* or disinfect* or sterili* or soap or treat* or sanitiz*)).ti.
7 ("Hand washing" or handwashing or hand-washing or "hand hygiene" or ((hand or hands) adj2 wash*)).ab. or ("Hand washing" or handwashing or hand-washing or "hand hygiene" or ((hand or hands) adj2 wash*)).ti.
8 1 or 2 or 3 or 4 or 5 or 6 or 7
9 limit 8 to yr="1980 -Current"
10 (Promot* or facilitat* or motivat* or encourag* or advoca* or persua* or sustain* or behaviour* or behavior* or habit* or custom* or tendency or packag* or program* or campaign*).ab. or (Promot* or facilitat* or motivat* or encourag* or advoca* or persua* or sustain* or behaviour* or behavior* or habit* or custom* or tendency or packag* or program* or campaign*).ti.
11 (Educat* or train* or lectur* or workshop* or game* or demonstrat*OR quiz* or IBM-WASH or RANAS).ab. or (Educat* or train* or lectur* or workshop* or game* or demonstrat*OR quiz* or IBM-WASH or RANAS).ti.
12 (community-based or participation or participatory or "Community Led Total Sanitation" or CLTS or "Participatory Rural Appraisal" or "Participatory Hygiene and Sanitation Transformation" or SARAR or "community reunion*" or "hygiene club*" or "mother club*" or "mothers club*" or "health club*" or "child-to-child" or "Urban Led Total Sanitation" or "community approach*" or "Community Action Planning" or "model home").ab. or (community-based or participation or participatory or "Community Led Total Sanitation" or CLTS or "Participatory Rural Appraisal" or "Participatory Hygiene and Sanitation Transformation" or SARAR or "community reunion*" or "hygiene club*" or "mother club*" or "mothers club*" or "health club*" or "child-to-child" or "Urban Led Total Sanitation" or "community approach*" or "Community Action Planning" or "model home").ti.
13 (market* or "market-based" or "product design" or "supply side improvements" or incentiv* or subsidy or subsidies or voucher* or "cash transfer*" or microcredit* or micro-credit* or loan* or financ* or advocacy or advocat*).ab. or (market* or "market-based" or "product design" or "supply side improvements" or incentiv* or subsidy or subsidies or voucher* or "cash transfer*" or microcredit* or micro-credit* or loan* or financ* or advocacy or advocat*).ti.
14 ("change agent*" or "transformation agent*" or "hygiene promotor*" or "community leader*" or song* or "radio spot" or "radio program*" or megaphone or "focus group*" or cinema* or theatr* or television or TV or play* or "hygiene day*" or sticker* or poster* or billboard* or painting* or "home visit*" or "mass media" or disgust).ab. or ("change agent*" or "transformation agent*" or "hygiene promotor*" or "community leader*" or song* or "radio spot" or "radio program*" or megaphone or "focus group*" or cinema* or theatr* or

television or TV or play* or "hygiene day*" or sticker* or poster* or billboard* or painting* or "home visit*" or "mass media" or disgust).ti.
15 health education/ or education/ or social work education/
16 health promotion/
17 lifestyle/
18 consumer participation.mp.
19 social marketing/
20 health behavior/
21 motivation/
22 decision making/
23 medical information/
24 information dissemination/
25 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24
26 9 and 25
27 developing countries.mp. or developing country/
28 ((developing or "less* developed" or " under developed" or underdeveloped or "middle income or low* income" or underserved or deprived or poor*) and (countr* or nation* or population*)).ab. or ((developing or "less* developed" or " under developed" or underdeveloped or "middle income or low* income" or underserved or deprived or poor*) and (countr* or nation* or population*)).ti.
29 "Africa south of the Sahara"/ or South Africa/ or North Africa/ or Central Africa/
30 South Asia/ or Southeast Asia/
31 Caribbean/
32 South America/
33 (Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brazil or Bulgaria or "Burkina Faso" or "Burkina Fasso" or "Upper Volta" or Burundi or Urundi or Cambodia or "Khmer Republic" or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or "Cape Verde" or "Central African Republic" or Chad or Chile or China or Colombia or Comoros or "Comoro Islands" or Comores or Mayotte or Congo or Zaire or "Costa Rica" or "Cote d'Ivoire" or "Ivory Coast" or Croatia or Cuba or Cyprus or Czechoslovakia or "Czech Republic" or Slovakia or "Slovak Republic").mp.
34 (Djibouti or "French Somaliland" or Dominica or "Dominican Republic" or "East Timor" or "East Timur" or "Timor Leste" or Ecuador or Egypt or "United Arab Republic" or "El Salvador" or Eritrea or Estonia or Ethiopia or Fiji or Gabon or "Gabonese Republic" or Gambia or Gaza or Georgia or Georgian or Ghana or "Gold Coast" or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or "Isle of Man" or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or "Kyrgyz Republic" or Kirghiz or Kirgizstan or "Lao PDR" or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania).

35 (Macedonia or Madagascar or "Malagasy Republic" or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or "Marshall Islands" or Mauritania or Mauritius or "Agalega Islands" or Mexico or Micronesia or "Middle East" or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or "Netherlands Antilles" or "New Caledonia" or Nicaragua or Niger or Nigeria or "Northern Mariana Islands" or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or "Puerto Rico").mp.

36 (Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or "Saint Kitts" or "St Kitts" or Nevis or "Saint Lucia" or "St Lucia" or "Saint Vincent" or "St Vincent" or Grenadines or Samoa or "Samoan Islands" or "Navigator Island" or "Navigator Islands" or "Sao Tome" or "Saudi Arabia" or Senegal or Serbia or Montenegro or Seychelles or "Sierra Leone" or Slovenia or "Sri Lanka" or Ceylon or "Solomon Islands" or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or "Togolese Republic" or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or "Soviet Union" or "Union of Soviet Socialist Republics" or Uzbekistan or Uzbek or Vanuatu or "New Hebrides" or Venezuela or Vietnam or "Viet Nam" or "West Bank" or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).mp.

37 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36

38 26 and 37

39 limit 38 to yr="1980 -Current"

6) PsycINFO and ERIC (EBSCOHost)

S32 S23 AND S31

S31 S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30

S30 TI (Romania or Rumania or Roumania or Rwanda or Ruanda or "Saint Kitts" or "St Kitts" or Nevis or "Saint Lucia" or "St Lucia" or "Saint Vincent" or "St Vincent" or Grenadines or Samoa or "Samoan Islands" or "Navigator Island" or "Navigator Islands" or "Sao Tome" or "Saudi Arabia" or Senegal or Serbia or Seychelles or "Sierra Leone" or Slovenia or "Sri Lanka" or Ceylon or "Solomon Islands" or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or "Togolese Republic" or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uzbekistan or Uzbek or Vanuatu or "New Hebrides" or Venezuela or Vietnam or "Viet Nam" or "West Bank" or Yemen or Zambia or Zimbabwe) OR AB (Romania or Rumania or Roumania or Rwanda or Ruanda or "Saint Kitts" or "St Kitts" or Nevis or "Saint Lucia" or "St Lucia" or "Saint Vincent" or "St Vincent" or Grenadines or Samoa or "Samoan Islands" or "Navigator Island" or "Navigator Islands" or "Sao Tome" or "Saudi Arabia" or Senegal or Serbia or Seychelles or "Sierra Leone" or Slovenia or "Sri Lanka" or Ceylon or "Solomon Islands" or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or

Thailand or Togo or "Togolese Republic" or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uzbekistan or Uzbek or Vanuatu or "New Hebrides" or Venezuela or Vietnam or "Viet Nam" or "West Bank" or Yemen or Zambia or Zimbabwe)

S29 TI (Macedonia or Madagascar or "Malagasy Republic" or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or "Marshall Islands" or Mauritania or Mauritius or "Agalega Islands" or Mexico or Micronesia or "Middle East" or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or "Netherlands Antilles" or "New Caledonia" or Nicaragua or Niger or Nigeria or "Northern Mariana Islands" or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or "Puerto Rico") OR AB (Macedonia or Madagascar or "Malagasy Republic" or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or "Marshall Islands" or Mauritania or Mauritius or "Agalega Islands" or Mexico or Micronesia or "Middle East" or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or "Netherlands Antilles" or "New Caledonia" or Nicaragua or Niger or Nigeria or "Northern Mariana Islands" or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or "Puerto Rico")

S28 TI (Djibouti or "French Somaliland" or Dominica or "Dominican Republic" or "East Timor" or "East Timur" or "Timor Leste" or Ecuador or Egypt or "United Arab Republic" or "El Salvador" or Eritrea or Ethiopia or Fiji or Gabon or "Gabonese Republic" or Gambia or Gaza or Georgia or Georgian or Ghana or "Gold Coast" or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or "Isle of Man" or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or "Kyrgyz Republic" or Kirghiz or Kirgizstan or "Lao PDR" or Laos or Lebanon or Lesotho or Basutoland or Liberia or Libya) OR AB (Djibouti or "French Somaliland" or Dominica or "Dominican Republic" or "East Timor" or "East Timur" or "Timor Leste" or Ecuador or Egypt or "United Arab Republic" or "El Salvador" or Eritrea or Ethiopia or Fiji or Gabon or "Gabonese Republic" or Gambia or Gaza or Georgia or Georgian or Ghana or "Gold Coast" or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or "Isle of Man" or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or "Kyrgyz Republic" or Kirghiz or Kirgizstan or "Lao PDR" or Laos or Lebanon or Lesotho or Basutoland or Liberia or Libya)

S27 TI (Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brazil or Bulgaria or "Burkina Faso" or "Burkina Fasso" or "Upper Volta" or Burundi or Urundi or Cambodia or "Khmer Republic" or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or "Cape Verde" or "Central African Republic" or Chad or Chile or China or Colombia or

Comoros or "Comoro Islands" or Comores or Mayotte or Congo or Zaire or "Costa Rica" or "Cote d'Ivoire" or "Ivory Coast" or Croatia or Cuba or Cyprus) OR AB (Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brazil or Bulgaria or "Burkina Faso" or "Burkina Fasso" or "Upper Volta" or Burundi or Urundi or Cambodia or "Khmer Republic" or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or "Cape Verde" or "Central African Republic" or Chad or Chile or China or Colombia or Comoros or "Comoro Islands" or Comores or Mayotte or Congo or Zaire or "Costa Rica" or "Cote d'Ivoire" or "Ivory Coast" or Croatia or Cuba or Cyprus)

S26 TI (asia or africa or south america or oceania or latin america) OR AB (asia or africa or south america or oceania or latin america)

S25 SU low and middle income countries

S24 SU developing countries or developing nations or third world or low income countries

S23 S7 AND S22

S22 S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21

S21 SU health information

S20 SU decision making

S19 SU decision making

S18 SU social marketing

S17 SU social marketing

S16 SU consumer behaviour

S15 SU consumer behaviour

S14 SU health behaviour

S13 SU health promotion

S12 TI ("change agent*" OR “transformation agent*” OR “hygiene promotor*” OR “community leader*” OR song* OR “radio spot” OR “radio program*” OR megaphone OR “focus group*” OR cinema* OR theatr* OR television OR TV OR play* OR “hygiene day*” OR sticker* OR poster* OR billboard* OR painting* OR “home visit*” OR “mass media” OR disgust) OR AB ("change agent*" OR “transformation agent*” OR “hygiene promotor*” OR “community leader*” OR song* OR “radio spot” OR “radio program*” OR megaphone OR “focus group*” OR cinema* OR theatr* OR television OR TV OR play* OR “hygiene day*” OR sticker* OR poster* OR billboard* OR painting* OR “home visit*” OR “mass media” OR disgust)

S11 TI (market* OR “market-based” OR “product design” OR “supply side improvements” or incentiv* OR subsidy OR subsidies OR voucher* OR “cash transfer*” OR microcredit OR micro-credit* OR loan* OR financ* or advocacy OR advocat*) OR AB (market* OR “market-based” OR “product design” OR “supply side improvements” or incentiv* OR subsidy OR subsidies OR voucher* OR “cash transfer*” OR microcredit OR micro-credit* OR loan* OR financ* or advocacy OR advocat*)

S10 TI (community-based OR participation OR participatory OR “Community Led Total Sanitation” OR CLTS OR “Participatory Rural Appraisal” OR “Participatory Hygiene and Sanitation Transformation” OR SARAR OR “community reunion*” OR “hygiene club*” OR “mother club*” OR “mothers club*” OR “health club*” OR “child-to-child” OR “Urban Led Total Sanitation” OR “community approach*” OR “Community Action Planning” OR “model home”) OR AB (community-based OR participation OR participatory OR “Community Led Total Sanitation” OR CLTS OR “Participatory Rural Appraisal” OR “Participatory Hygiene and Sanitation Transformation” OR SARAR OR “community reunion*” OR “hygiene club*” OR “mother club*” OR “mothers club*” OR “health club*” OR “child-to-child” OR “Urban Led Total Sanitation” OR “community approach*” OR “Community Action Planning” OR “model home”)

S9 TI (Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* or IBM-WASH OR RANAS) OR AB (Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* or IBM-WASH OR RANAS)

S8 TI (Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR AB (Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*)

S7 S1 OR S2 OR S3 OR S4 OR S5 OR S6

S6 TI ("Hand washing” OR handwashing OR hand-washing OR “hand hygiene” OR ((hand or hands) AND wash*)) OR AB ("Hand washing” OR handwashing OR hand-washing OR “hand hygiene” OR ((hand or hands) AND wash*))

S5 AB sanitation or hygiene or cleanliness

S4 TI sanitation

S3 TI (Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*)) OR AB (Hand* AND (clean* OR disinfect* OR sterili* OR soap OR treat* OR sanitiz*))

S2 TI (latrine* OR toilet* OR sanitation OR lavator* OR “water closet*”) OR AB (latrine* OR toilet* OR sanitation OR lavator* OR “water closet*”)

S1 TI (1. (Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR “human waste” OR “night soil” OR excreta) AND (Dispos* OR Manag*)) OR AB (1. (Faeces OR feces OR fecal OR faecal OR defecat* OR excrement* OR “human waste” OR “night soil” OR excreta) AND (Dispos* OR Manag*))

7) 3ie Impact Evaluation Database

Search for collections: handwashing, sanitation, toilets, human waste, excreta disposal.

8) International Bibliography of the Social Sciences (IBSS) and Sociological Abstracts (ProQuest)

S8 ((ab("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries") OR ti("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries") OR su("developing countries" OR "low

and middle income countries" OR LMIC OR "less developed countries")) OR (ab(asia OR Africa OR Caribbean OR "latin America") OR ti(asia OR Africa OR Caribbean OR "latin America") OR su(asia OR Africa OR Caribbean OR "latin America"))) AND ((ab(sanitation OR hygiene OR handwashing OR (human waste)) OR ti(sanitation OR hygiene OR handwashing OR (human waste))) AND (ab(promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR ti(promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*)))

S7 (ab("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries") OR ti("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries") OR su("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries")) OR (ab(asia OR Africa OR Caribbean OR "latin America") OR ti(asia OR Africa OR Caribbean OR "latin America") OR su(asia OR Africa OR Caribbean OR "latin America"))

S6 ab(asia OR Africa OR Caribbean OR "latin America") OR ti(asia OR Africa OR Caribbean OR "latin America") OR su(asia OR Africa OR Caribbean OR "latin America")Limits applied

S5 ((ab(sanitation OR hygiene OR handwashing OR (human waste)) OR ti(sanitation OR hygiene OR handwashing OR (human waste))) AND (ab(promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR ti(promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*))) AND (ab("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries") OR ti("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries") OR su("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries"))

S4 ab("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries") OR ti("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries") OR su("developing countries" OR "low and middle income countries" OR LMIC OR "less developed countries")Limits applied

S3 (ab(sanitation OR hygiene OR handwashing OR (human waste)) OR ti(sanitation OR hygiene OR handwashing OR (human waste))) AND (ab(promot* OR facilitat* OR motivat*

OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR ti(promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*))

S2 ab(promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR ti(promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*)Limits applied

S1 ab(sanitation OR hygiene OR handwashing OR (human waste)) OR ti(sanitation OR hygiene OR handwashing OR (human waste))Limits applied

9) Social Sciences Citation Index (SSCI, Web of Science)

# 5 #4 AND #3
Indexes=SSCI, CPCI-S Timespan=1980-2016
# 4 TOPIC: (: (((developing or “less* developed” or “ under developed” or underdeveloped or “middle income “or “low* income” or underserved or deprived or poor*) AND (countr* or nation* or population*)))) OR TOPIC: (“low and middle income countries”) OR TOPIC: (asia or africa or south america or oceania or "latin america" or caribbean) OR TOPIC: (Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brazil or Bulgaria or "Burkina Faso" or "Burkina Fasso" or "Upper Volta" or Burundi or Urundi or Cambodia or "Khmer Republic" or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or "Cape Verde" or "Central African Republic" or Chad or Chile or China or Colombia or Comoros or "Comoro Islands" or Comores or Mayotte or Congo or Zaire or "Costa Rica" or "Cote d'Ivoire" or "Ivory Coast" or Croatia or Cuba or Cyprus or Djibouti or "French Somaliland" or Dominica or "Dominican Republic" or "East Timor" or "East Timur" or "Timor Leste" or Ecuador or Egypt or "United Arab Republic" or "El Salvador" or Eritrea or Ethiopia or Fiji or Gabon or "Gabonese Republic" or Gambia or Gaza or Georgia or Georgian or Ghana or "Gold Coast" or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or "Isle of Man" or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or "Kyrgyz Republic" or Kirghiz or Kirgizstan or "Lao PDR" or Laos or Lebanon or Lesotho or Basutoland or Liberia or Libya) OR TOPIC: (Macedonia or Madagascar or "Malagasy Republic" or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or "Marshall Islands" or Mauritania or Mauritius or

"Agalega Islands" or Mexico or Micronesia or "Middle East" or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or "Netherlands Antilles" or "New Caledonia" or Nicaragua or Niger or Nigeria or "Northern Mariana Islands" or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or "Puerto Rico" or Romania or Rumania or Roumania or Rwanda or Ruanda or "Saint Kitts" or "St Kitts" or Nevis or "Saint Lucia" or "St Lucia" or "Saint Vincent" or "St Vincent" or Grenadines or Samoa or "Samoan Islands" or "Navigator Island" or "Navigator Islands" or "Sao Tome" or "Saudi Arabia" or Senegal or Serbia or Seychelles or "Sierra Leone" or Slovenia or "Sri Lanka" or Ceylon or "Solomon Islands" or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or "Togolese Republic" or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uzbekistan or Uzbek or Vanuatu or "New Hebrides" or Venezuela or Vietnam or "Viet Nam" or "West Bank" or Yemen or Zambia or Zimbabwe)
Indexes=SSCI, CPCI-S Timespan=1980-2016
# 3 #2 AND #1
Indexes=SSCI, CPCI-S Timespan=1980-2016
# 2 TOPIC: (Promot* OR facilitat* OR motivat* OR encourag* OR advoca* OR persua* OR sustain* OR behaviour* OR behavior* OR habit* OR custom* OR tendency OR packag* OR program* OR campaign*) OR TOPIC: (Educat* OR train* OR lectur* OR workshop* OR game* OR demonstrat*OR quiz* or IBM-WASH OR RANAS) OR TOPIC: (community-based OR participation OR participatory OR “Community Led Total Sanitation” OR CLTS OR “Participatory Rural Appraisal” OR “Participatory Hygiene and Sanitation Transformation” OR SARAR OR “community reunion*” OR “hygiene club*” OR “mother club*” OR “mothers club*” OR “health club*” OR “child-to-child” OR “Urban Led Total Sanitation” OR “community approach*” OR “Community Action Planning” OR “model home”) OR TOPIC: (market* OR “market-based” OR “product design” OR “supply side improvements” or incentiv* OR subsidy OR subsidies OR voucher* OR “cash transfer*” OR microcredit OR micro-credit* OR loan* OR financ* or advocacy OR advocat*) OR TOPIC: (“change agent*” OR “transformation agent*” OR “hygiene promotor*” OR “community leader*” OR song* OR “radio spot” OR “radio program*” OR megaphone OR “focus group*” OR cinema* OR theatr* OR television OR TV OR play* OR “hygiene day*” OR sticker* OR poster* OR billboard* OR painting* OR “home visit*” OR “mass media” OR disgust)
Indexes=SSCI, CPCI-S Timespan=1980-2016
# 1 TOPIC: ((toilet* or sanitation or lavator* or "water closet*" or sanitation)) OR TOPIC: ((Hand* and (clean* or disinfect* or sterili* or soap or treat* or sanitiz*))) OR TOPIC: (("Hand washing" or handwashing or hand-washing or "hand hygiene" or ((hand or hands) and wash*))) OR TOPIC: (((Faeces or feces or fecal or faecal or defecat* or excrement* or "human waste" or "night soil" or excreta) and (Dispos* or Manag*)))
Indexes=SSCI, CPCI-S Timespan=1980-2016

Appendix 4: Search report

Search No.	Date	Database searched	Results before de-duplication
1	25/03/2016	MEDLINE (PubMed)	8337
2	25/03/2016	Cochrane CENTRAL issue 2 of 12, February 2016	563
3	28/03/2016	Applied Social Sciences Index and Abstracts (ASSIA, Proquest)	364
4	28/03/2016	Global Health (CABI)	4250
5	29/03/2016	EMBASE (OVID)	10708
6	29/03/2016	PsycINFO (EBSCOHost)	946
7	29/03/2016	ERIC (EBSCOHost)	291
8	30/03/2016	Global Index Medicus	1587
9	30/03/2016	3ie Impact Evaluation Database	5 (pdfs)
10	30/03/2016	International Bibliography of the Social Sciences (IBSS, ProQuest)	183
11	30/03/2016	Sociological abstracts (ProQuest)	128
12	30/03/2016	Social Sciences Citation Index (SSCI, Web of Science)	3326
FINAL NUMBER OF REFERENCES BEFORE DE-DUPLICATION = 30683			
FINAL NUMBER OF REFERENCES AFTER DE-DUPLICATION = 23435			

Appendix 5: Coding tool for data extraction in quantitative studies

1. Identification of reference

- ☐ Study ID
- ☐ Title
- ☐ First author
- ☐ Year of publication
- ☐ Source of publication
  - ☐ Database
    - ☐ Journal article
    - ☐ Report
    - ☐ Book
    - ☐ Dissertation
    - ☐ Other (specify)
  - ☐ Grey literature
    - ☐ Journal article
    - ☐ Report
    - ☐ Book
    - ☐ Dissertation
    - ☐ Ohter (specify)

2. Study population and scale of the intervention

- ☐ Number of sites
  - ☐ Single methodology and single site
  - ☐ Single methodology and multiple sites geographically contiguous or close to each other
  - ☐ Single methodology and multiple geographically separated sites
  - ☐ Multiple methodologies and multiple sites
  - ☐ Other (please specify)
  - ☐ No information
- ☐ If multi-site, how many?
  # of sites
- ☐ Scale of the study
  - ☐ Small scale (one/several village(s))
  - ☐ Large scale (sub-district, district, province, region, national)
  - ☐ Other (please specify)
  - ☐ No information
- ☐ Region of the study
  - ☐ Latin America and Caribbean
  - ☐ Near East and North Africa
  - ☐ Sub-Saharan Africa
  - ☐ South Asia
  - ☐ East Asia
  - ☐ South-East Asia and Oceania

- Country site for the study
  Name of the country the study/intervention was conducted in
- Income of the country *(see World Bank Analytical Classifications)*
  - Low-income country
  - Lower middle-income country
  - Upper middle-income country
- Setting
  - Rural
  - Urban
  - Informal-rural
  - Other (please specify)
  - No information
- Target level
  - Individual
  - Household
  - Village
  - School
  - Community
  - Compound
  - District
  - Other (please specify)
  - No information
- Approximate population
  The approximate population covered in the study/intervention
- Intervention group 1 (baseline data) (similar items were extracted for intervention group 2 and 3 (if present) and the control group)
  - Number of participants
    - Individuals (please specify number)
    - Households (please specify number)
    - Villages (please specify number)
    - Hamlets (please specify number)
    - Schools (please specify number)
    - Compounds (please specify number)
    - Districts (please specify number)
    - Wards (please specify number)
    - Communes (please specify number)
    - Other (please specify)
  - Age
    - Mean (years)
    - Standard deviation (years)
    - Standard error (years)
    - Mean (months)
    - Standard deviation (months)
    - <5 years (n)
    - >25 years (n)
    - Ages 7-13 years (please specify number)
    - 0-5 years (please specify number)

- 6-12 years (please specify number)
- 13-18 years (please specify number)
- 19+ years (please specify number)
- Under 5 years of age children per household (mean)
- Under 5 years of age children per household (std)
- Under 5 years of children per household (se)
- Age household head in years (mean)
- Age household head in years (se)
- Other (please specify)
- No information
- <12 years (n)

- Socio-economic status
  - Household income
    - Reported (please specify)
    - Not reported
  - Level of education
    - No education (please specify number)
    - Early childhood education (please specify number)
    - Secondary education (please specify number)
    - Higher secondary (please specify number)
    - Graduation and above (please specify number)
    - Tertiary education (please specify number)
    - >1 year of school education (please specify number)
    - Literate (please specify number)
    - Elementary school or no schooling (please specify number)
    - At least some middle school or higher (please specify number)
    - Primary & secondary education (please specify number)
    - None or less than a year (please specify number)
    - Secondary and higher (please specify number)
    - Grades 2-5 (please specify number)
    - Median years of maternal education (range)
    - Median years of paternal education (range)
    - Median years of paternal education (range)
    - Primary or less (please specify number)
    - Secondary incomplete (please specify number)
    - Secondary or more (please specify number)
    - Other (please specify)
    - No information
    - Incomplete primary (mean)
    - Incomplete primary (se)
    - Complete primary (mean)
    - Complete primary (se)
    - Incomplete secondary (mean)
    - Incomplete secondary (se)
    - Complete secondary (mean)
    - Complete secondary (se)

- Higher (mean)
- Higher (se)
- Whether household head went to school (mean)
- Years of education (if attended school) (mean)

- Occupation
  - Labourer (please specify number)
  - Farmer (please specify number)
  - Not farmer (please specify number)
  - Labourer + own farm work (please specify number)
  - Business (please specify number)
  - Student (please specify number)
  - Works for money (please specify number)
  - Not employed (please specify number)
  - Non-formal employment (please specify number)
  - Housewives (please specify number)
  - Vendor (please specify number)
  - Teacher (please specify number)
  - Day Laborer (please specify number)
  - Homemaker (please specify number)
  - Mother works outside home (please specify number)
  - Other (please specify number)
  - Other (please specify)
  - No information
  - Self-employed (mean)
  - Self-employed (se)
  - Employer or boss (mean)
  - Employer or boss (se)
  - Worker with no remuneration (mean)
  - Worker with no remuneration (se)
  - Day laborer (mean)
  - Day laborer (se)
  - Working in household activities or production (mean)
  - Working in household activities or production (se)
  - Paid employee (please specify number)
  - Self-employment with employees (please specify number)
  - Remmitances (please specify number)
  - Self-employed agricultural (please specify number)
  - Agricultural sector (please specify number)
  - Formal sector (please specify number)

- Gender
  - Number of women (please specify)
  - No information

- Language
  - Reported (please specify)
  - Not reported

- Physical health

- Reported (please specify)
- Not reported

- Mental health
  - Reported (please specify)
  - Not reported
- Race
  - White (please specify number)
  - Native Hawaiian or Other Pacific Islander (please specify number)
  - Black or African American (please specify number)
  - Asian (please specify number)
  - American Indian or Alaska native (please specify number)
  - Other (please specify)
  - No information
- Religion
  - No religion (please specify number)
  - Hinduism (please specify number)
  - Islam (please specify number)
  - Christianity (please specify number)
  - Conventional christians (please specify number)
  - Apostolic christians (please specify number)
  - Buddhism (please specify number)
  - Protestant (please specify number)
  - Other (please specify)
  - No information

3. Study design and methodology

- Study type
  - Experimental design
    - (Cluster) randomised controlled trial
    - Quasi-randomised controlled trial
  - Quasi-experimental design
    - Non-randomised controlled trial
  - Observational design
    - Cohort study
    - Case-control study
- Study date
  - In which month and year did the study start?
    - In which month did the study start?
      - January
      - February
      - March
      - April
      - May
      - June
      - July

- August
- September
- October
- November
- December

- In which year did the study start?
  - 1980
  - 1981
  - 1982
  - 1983
  - 1984
  - 1985
  - 1986
  - 1987
  - 1988
  - 1989
  - 1990
  - 1991
  - 1992
  - 1993
  - 1994
  - 1995
  - 1996
  - 1997
  - 1998
  - 1999
  - 2000
  - 2001
  - 2002
  - 2003
  - 2004
  - 2005
  - 2006
  - 2007
  - 2008
  - 2009
  - 2010
  - 2011
  - 2012
  - 2013
  - 2014
  - 2015
  - 2016
  - No information

- In which month and year did the study end?
  - In which month did the study end?

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

- In which year did the study end?
  - 1980
  - 1981
  - 1982
  - 1983
  - 1984
  - 1985
  - 1986
  - 1987
  - 1988
  - 1989
  - 1990
  - 1991
  - 1992
  - 1993
  - 1994
  - 1995
  - 1996
  - 1997
  - 1998
  - 1999
  - 2000
  - 2001
  - 2002
  - 2003
  - 2004
  - 2005
  - 2006
  - 2007
  - 2008
  - 2009
  - 2010
  - 2011
  - 2012

- 2013
- 2014
- 2015
- 2016
- No information

- Was the study conducted during the implementation of the programme?
  - Yes, the study was conducted during the implementation of the programme
    - Reported (please specify number of months)
    - Not reported
  - No, the study was conducted after the implementation was ended
    - Reported (please specify number of months)
    - Not reported
  - No information

4. Intervention 1 (similar items were extracted for intervention group 2 and 3 and the control group (if present))

- Intervention of interest
  - Name of the programme
    - Reported (please specify)
    - Not reported
  - Aim of the programme
    - Reported (please specify)
    - Not reported
  - WASH components of the programme
    - Sanitation
    - Personal Hygiene: Handwashing
    - Hygiene
    - Water supply
    - Water quality
    - Water treatment
    - WASH (general)
    - Other (please specify)
  - Promotional approach
    - Health education
    - Psychosocial theories
    - Community-based participatory approaches
    - Marketing approaches
    - Incentives
    - Advocacy
    - Social cognitive model
    - Public commitment
    - Infrastructure promotion
    - Behaviour change techniques
    - Other (please specify)
  - Communication strategies used

- Interpersonal communication (please specify)
- Mass media communication (please specify)
- Traditional communication (please specify)
- Other (please specify)
- Not reported

- Content of the programme (please specify)

- Implementers
  - Who are the implementers?
    - Reported (please specify)
    - Not reported
  - Ethnicity
    Was the implementer's ethnicity considered?
    - No information on ethnicity
    - Information on ethnicity
      - Descriptive non-quantitative (please specify)
      - Descriptive quantitative (please speficy)
  - Age
    Was the age of the implementer considered?
    - No information on age
    - Information on age
      - Descriptive non-quantitative (please specify)
      - Descriptive quantitative (please specify)
  - Gender
    Was the gender of the implementer considered?
    - No information on gender
    - Information on gender
      - Descriptive non-quantitative (please specify)
      - Descriptive quantitative (please specify)
  - Socio-economic status
    Was the implementer's socio-economic status considered?
    - No information on socio-economic status
    - Information on socio-economic status
      - Descriptive non-quantitative (please specify)
      - Descriptive quantitative (please specify)
  - Role of the evaluator
    Does the study/programme address the role of the evaluator?
    Please specify whether the role of the evaluator has been addressed. They may be involved in implementing the intervention, supervising the intervention or providing leadership support to implementers.
    - No information on role of the evaluator
    - Information on role of the evaluator
      - Descriptive non-quantitative (please specify)
      - Descriptive quantitative (please specify)
  - Implementer training/qualifications
    Has the study/programme considered any aspects related to implementer training? Does the implementer has any specific qualifications, experience or competence for implementing the programme?

- ☐ No information on training/qualifications
- ☐ Information on training/qualifications
  - ☐ Descriptive non-quantitative (please specify)
  - ☐ Descriptive quantitative (please specify)

☐ Implementing organization

- ☐ Leadership
  Has the study/programme considered the presence of programme champions or leaders?
  - ☐ No information on leadership
  - ☐ Information on leadership
    - ☐ Descriptive non-quantitative (please specify)
    - ☐ Descriptive quantitative (please specify)
- ☐ Funding
  Has the study/programme considered the adequacy of resourcing/funding?
  - ☐ No information on funding
  - ☐ Information on funding
    - ☐ Descriptive non-quantitative (please specify)
    - ☐ Descriptive quantitative (please specify)
- ☐ Qualitative training materials
  Are the training materials of a good quality? E.g. developed for the purpose of the programme, culturally sensitive,...
  - ☐ No information on qualitative training materials
  - ☐ Information on qualitative training materials
    - ☐ Descriptive non-quantitative (please specify)
    - ☐ Descriptive quantitative (please specify)
- ☐ Technical support or supervisory guidance
  Has the study/programme considered the provision of technical support or supervisory guidance to staff during implementation?
  - ☐ No information on technical support or supervisory guidance
  - ☐ Information on technical support or supervisory guidance
    - ☐ Descriptive non-quantitative (please specify)
      - Not considered
      - Considered but unable
    - ☐ Descriptive quantitative (please specify)
- ☐ Partnership/coordination between providers
  Does the study/programme consider partnership, coordination between providers of the same intervention or other health interventions?
  - ☐ No information on partnership/coordination between providers
  - ☐ Information on partnership/coordination between providers

☐ Process evaluation factors

- ☐ Recruitment
  Refers to specific information on the procedures used to recruit participants into or attract participants to the intervention. Was any information on recruitment included?
  - ☐ No information on recruitment
  - ☐ Information on recruitment
    - ☐ Descriptive non-quantitative (please specify)

- Descriptive quantitative (please specify)

- Reach
  Reach refers to the degree to which the intended audience participates in an intervention by 'their presence'. Was any information on the ACTUAL participation rate in the programme (e.g. attendance rate) provided?
  - No information on reach
  - Information on reach
    - Descriptive non-quantitative (please specify)
    - Descriptive quantitative (please specify)
- Dose
  This concept refers to the proportion or amount of an intervention (or the combined strategies) delivered to participants; often measured through frequency (e.g., twice per week), duration (e.g., duration of programme in months) and intensity (e.g., total a programme delivery hours). Was the programme dose delivered.
  - No information on dose
  - Information on dose (please specify frequency/duration/intensity/type)
    - Descriptive non-quantitative
    - Descriptive quantitative
- Fidelity
  Was fidelity assessed, that is, the degree to which interventions are implemented as intended by its developers?
  - No information on fidelity
  - Information on fidelity
    - Descriptive non-quantitative (please specify)
    - Descriptive quantitative (please specify)
- Adaptation
  Was consideration given to adapting programmes to the local context?
  - No information on adaptation
  - Information on adaptation
    - Descriptive non-quantitative (please specify)
    - Descriptive quantitative (please specify)
- Participant Engagement
  Were participant's attitudes towards the programme or their feelings about the programme assessed?
  - No information on participant engagement
  - Information on participant engagement
    - Descriptive non-quantitative (please specify)
    - Descriptive quantitative (please specify)
- Implementer engagement
  Were provider's attitudes towards the programme or feelings about the programme addressed?
  - No information on implementer engagement
  - Information on implementer engagement
    - Descriptive non-quantitative (please specify)
    - Descriptive quantitative (please specify)

- ☐ Composite Implementation Measure
  Was a composite implementation measure used in the study/programme? A combination of different implementation measures (dose delivered, dose received, reach) to create a composite measure.
  - ☐ No information on composite implementation measure
  - ☐ Information on composite implementation measure
    - ☐ Descriptive non-quantitative (please specify)
    - ☐ Descriptive quantitative (please specify)
- ☐ Co-intervention
  Was co-intervention considered in the study/programme? When interventions other than the treatment under study are applied differently to the treatment and control/comparison groups.
  - ☐ No information on co-intervention
  - ☐ Information on co-intervention
    - ☐ Descriptive non-quantitative (please specify)
    - ☐ Descriptive quantitative (please specify)

5. Control group

- ☐ Did the comparison group received another intervention?
  - ☐ No, the control group received no/sham intervention
  - ☐ Yes (see items 4. Intervention 1)

6. Outcomes

- ☐ Primary outcomes (behavioural change outcomes)
  - ☐ Sanitation
    - ☐ Primary outcomes sanitation: Intention
      - ☐ Readiness (please indicate definition if available)
      - ☐ Willingness (please indicate definition if available)
      - ☐ Other (please specify)
    - ☐ Primary outcomes sanitation: Use
      - ☐ Uptake (please specify)
      - ☐ Adherence (please specify)
      - ☐ Longer-term use (please specify)
    - ☐ Primary outcomes sanitation: Habit
      - ☐ Routinized behaviour
      - ☐ Other (please specify)
  - ☐ Handwashing
    - ☐ Primary outcomes handwashing: Intention
      - ☐ Readiness (please indicate definition if available)
      - ☐ Willingness (please indicate definition if available)
      - ☐ Intention (please indicate definition if available)
      - ☐ Other (please specify)
    - ☐ Primary outcomes handwashing: Use

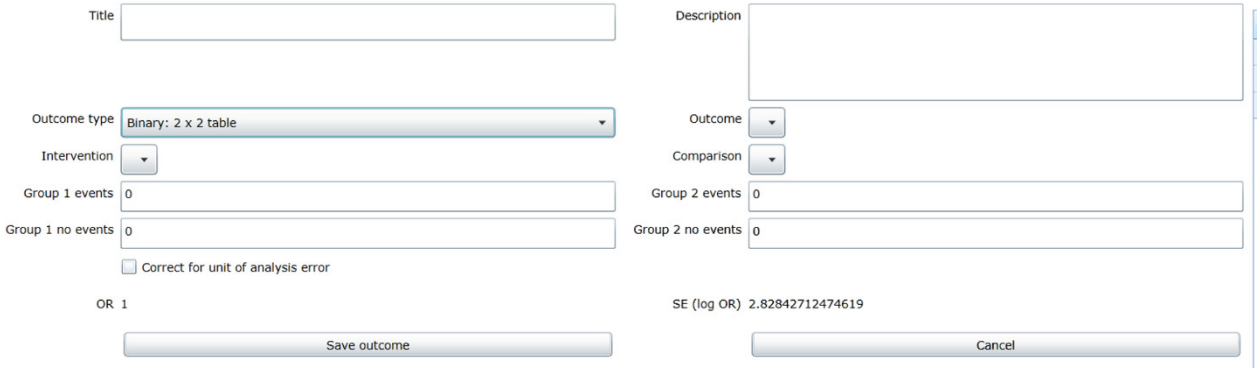
- Uptake (please specify)
- Adherence (please specify)
- Longer-term use (please specify)
- Primary outcomes handwashing: Habit
  - Routinized behaviour
  - Other (please specify)

- Secondary outcomes (behavioural factors)
  - Knowledge (please specify)
  - Skills (please specify)
  - Attitude (please specify)
  - Norms (Please specify)
  - Self-regulation (Please specify)
  - Ability factors (please specify)
- Secondary outcomes (health-related outcomes)
  - Morbidity (please specify)
  - Mortality (please specify)
- Methods of assessing outcomes
  - Primary outcomes (behavioural change outcomes)
    - Direct observation (please specify)
    - Demonstration (please specify)
    - Self-reported (please specify)
    - Parent-reported (please specify)
    - Teacher-reported (please specify)
    - Other (please specify)
    - No information
  - Secondary outcomes (behavioural factors)
    - Direct observation (please specify)
    - Directly measured (please specify)
    - Demonstration (please specify)
    - Self-reported (please specify)
    - Parent-reported (please specify)
    - Teacher-reported (please specify)
    - Other (please specify)
  - Secondary outcomes (health-related outcomes)
    - Direct observation (please specify)
    - Directly measured (please specify)
    - Self-reported (please specify)
    - Parent-reported (please specify)
- Timing of outcome assessment
  - Frequency
    - Reported (please specify)
    - Not reported
  - Length of follow-up
    - Reported (please specify)
    - Not reported

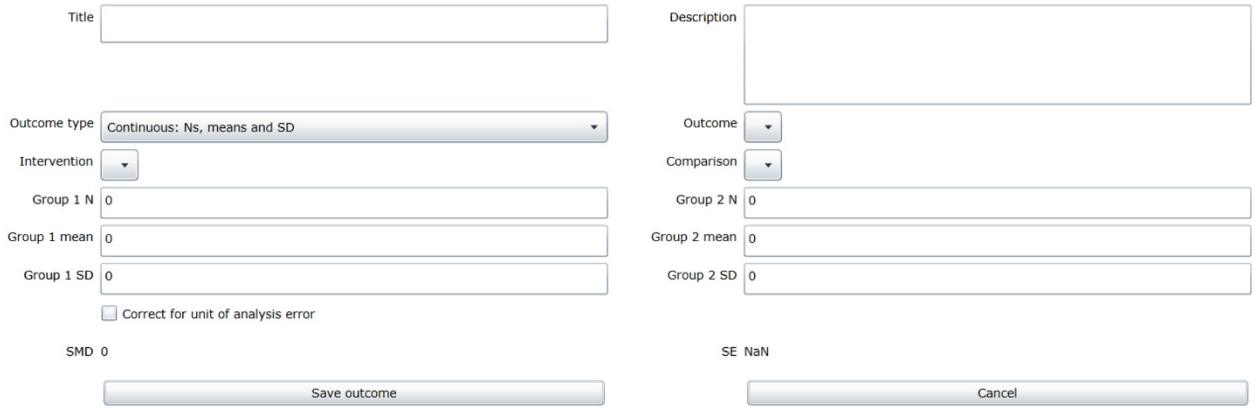
7. Results (were extracted in specific templates depending on the type of data (binary versus continuous versus calculated effect sizes (manual entry)

- ☐ Primary outcomes (behavioural change outcomes)
- ☐ Secondary outcomes (behavioural factors)
- ☐ Secondary outcomes (health-related outcomes)

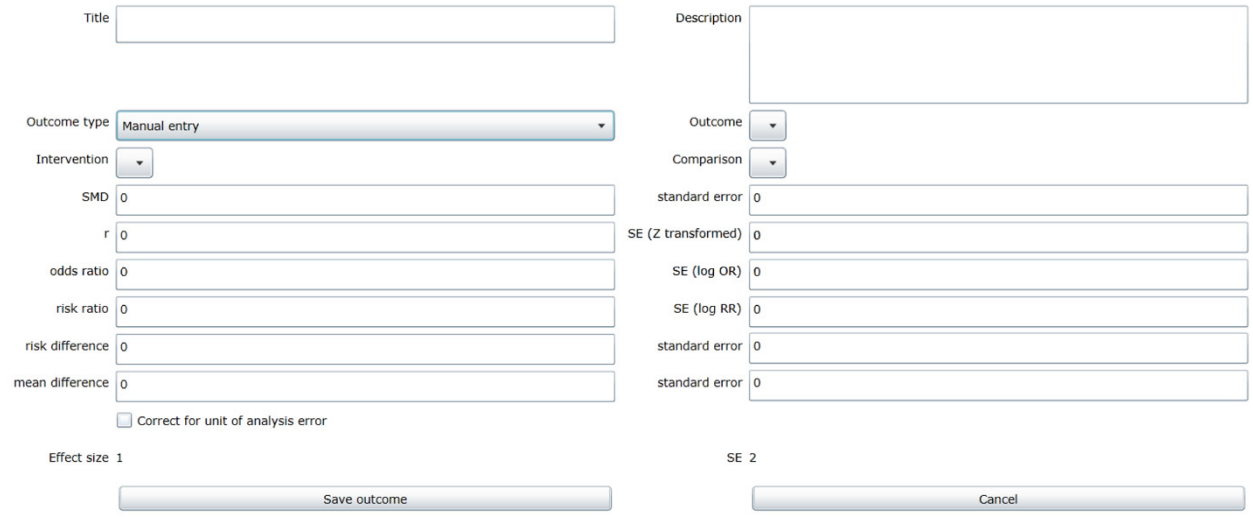
Screenshot of a EPPI-Reviewer template for extracting binary data



Screenshot of a EPPI-Reviewer template for extracting continuous data



Screenshot of a EPPI-Reviewer template for extracting calculated effect sizes (manual entry data)



Appendix 6: Coding tool for data extraction and inductive coding in qualitative studies

Data extraction

1. Identification of reference

- ☐ Study ID
- ☐ Title
- ☐ First author
- ☐ Year of publication
- ☐ Source of publication
  - ☐ Database
    - ☐ Database source: Journal article
    - ☐ Report
    - ☐ Book
    - ☐ Dissertation
    - ☐ Other (specify)
  - ☐ Grey literature
    - ☐ Journal article
    - ☐ Report
    - ☐ Book
    - ☐ Dissertation
    - ☐ Ohter (specify)

2. Study population

- ☐ Region of the study
  - ☐ Latin America and Caribbean
  - ☐ Near East and North Africa
  - ☐ Sub-Saharan Africa
  - ☐ South Asia
  - ☐ East Asia
  - ☐ South-East Asia and Oceania
- ☐ Country site for the study
  Name of the country the study/intervention was conducted in
- ☐ Income of the country (*see World Bank Analytical Classifications)*
  - ☐ Low-income country
  - ☐ Lower middle-income country
  - ☐ Upper middle-income country
- ☐ Setting
  - ☐ Rural
  - ☐ Urban
  - ☐ Informal-rural
  - ☐ Other (please specify)

- No information
- Target level
  - Individual
  - Household
  - Village
  - School
  - Community
  - Compound
  - District
  - Other (please specify)
  - No information

3. Intervention of interest

- Name of the programme
  - Reported (please specify)
  - Not reported
- Aim of the programme
  - Reported (please specify)
  - Not reported
- WASH components of the programme
  - Sanitation
  - Personal Hygiene: Handwashing
  - Hygiene
  - Water supply
  - Water quality
  - Water treatment
  - WASH (general)
  - Other (please specify)
  - No information
- Promotional approach
  - Health education
  - Psychosocial theories
  - Community-based participatory approaches
  - Marketing approaches
  - Incentives
  - Advocacy
  - Social cognitive model
  - Public commitment
  - Behaviour change techniques
  - Other (please specify)
- Content of the programme (please specify)

Inductive coding

The categories/themes (e.g. programme environment factors) and its items (e.g. training/qualification of implementers) were based on our theory of change model. New items were labeled as '(NEW)'.

1. Programme environment factors

- Training/qualification of implementers
  TRAINING: Assess whether any consideration has been given to training, the quality of training or any other aspect of training that acts to enhance the skills/ competency of service delivery staff.
  QUALIFICATIONS: Consideration to different types of implementers; please consider whether reviews
  considered implementer's education level, certifications, or past relevant experiences to
  assess their ability to do the job.
- Leadership of implementing organization
  Whether programme champions and leaders provide instructions or guidance to staff/implementers to facilitate the intervention delivery.
- Cultural sensitivity of training materials
  Interventions that consider the language, socio-cultural values and traditions may be considered more appropriate to the cultural groups in which they are intended to benefit.
- Partnership, coordination between providers of the same intervention or other health interventions
  Note any formal partnerships or collaborations during intervention planning or implementation
- Funding/Resources (NEW)
  Resources includes having sufficient personnel/ staff, financial resources/ operational budget, space, buildings or sites (physical resources), and materials/ equipment (technological resources) to run the programme.
- Intent of programme to change a specific outcome
- Availability of training materials (NEW)
- Community capacity (NEW)

2. Recipient-related contextual factors (similar items were extracted for the category 'Implementer-related contextual factors')

- Social cultural context
  - Dignity/respect
  - Culture
  - Religion
  - Ethnicity
  - Law/legislation
  - Socioeconomic status/authority/role model
  - Minorities

- Social capital
  Social capital refers to social relationships and networks. It includes interpersonal trust between members of a community, civic participation, and the willingness of members of a community to assist each other and facilitate the realization of collective community goals and the strength of their political connections, which can facilitate access to services.
- Information environment
  Adequate information systems to assess and monitor needs, resource use, and utilisation of targeted services may be needed to implement the option
- Division of labour
  The division of labour is the separation of tasks in any economic system so that participants may specialize. Individuals, organizations, and nations are endowed with or acquire specialized capabilities and either form combinations or trade to take advantage of the capabilities of others in addition to their own.

- Physical context

  - Place of residence (urban vs rural)
  - Low vs middle-income countries
  - Natural and built environment ((quality/maintenance of) infrastructure, geophysical)
  - Safety
  - Remote areas
  - Available space
  - Distance to distribution point (NEW)

- Personal context

  - Demographic variables (age, gender, race, cast, language, education, occupation)
  - Physical health
  - Mental health

- Social political context (NEW)

3. Recipient-related factors (similar items were extracted for the category 'Implementer-related contextual factors')

- Awareness of personal risk
- Self-efficacy
- Awareness about costs and benefits
- Public commitment
- Others showing behaviour
- Planning skills

- Norms (NEW)
- Knowledge (NEW)
- Motivation (NEW)

4. Process evaluation factors

- Recruitment
  Refers to specific information on the procedures used to recruit participants into or attract participants to the intervention.
- Attrition
  Attrition is a measure of drop-out rates, or the proportion of participants lost during the course of an intervention or during follow up
- Reach
  Reach refers to the degree to which the intended audience participates in an intervention by 'their presence'.
- Dose
  This concept refers to the proportion or amount of an intervention (or the combined strategies) delivered to participants; often measured through frequency (e.g., twice per week), duration (e.g., duration of programme in months) and intensity (e.g., total a programme delivery hours). Was the programme dose delivered.
- Fidelity
  Was fidelity assessed, that is, the degree to which interventions are implemented as intended by its developers?
- Adaptation
  Was consideration given to adapting programmes to the local context?
- Engagement
  Were participant's attitudes towards the programme or their feelings about the programme assessed?
  Were provider's attitudes towards the programme or feelings about the programme addressed?
- Satisfaction
- Acceptability
- Co-intervention (NEW)

Appendix 7: Risk of bias tools used for quantitative studies

Experimental studies

1. Selection bias

    i. Random sequence generation
        - ☐ Not applicable
        - ☐ Yes
        - ☐ Probably yes
        - ☐ Probably no
        - ☐ No
        - ☐ No information

    ii. Allocation concealment
        - ☐ Not applicable
        - ☐ Yes
        - ☐ Probably yes
        - ☐ Probably no
        - ☐ No
        - ☐ No information

2. Performance bias

    i. Blinding of participants

        - ☐ Not applicable
        - ☐ Yes
        - ☐ Probably yes
        - ☐ Probably no
        - ☐ No
        - ☐ No information

3. Detection bias

    i. Blinding of outcome assessment

        - ☐ Not applicable
        - ☐ Yes
        - ☐ Probably yes
        - ☐ Probably no
        - ☐ No
        - ☐ No information

4. Attrition bias

i. Incomplete outcome data

- Not applicable
- Yes
- Probably yes
- Probably no
- No
- No information

5. Reporting bias

i. Selective reporting

- Not applicable
- Yes
- Probably yes
- Probably no
- No
- No information

6. Statistical method

- Not applicable
- Yes
- Probably yes
- Probably no
- No
- No information

7. Other bias

i. Was the study free from other risks of bias due to problems not covered above?

- Not applicable
- Yes
- Probably yes
- Probably no
- No
- No information

8. Overall risk of bias judgement

- Low
- Moderate
- Serious

□ Critical

Quasi-experimental studies and observational studies

1. Bias in selection of participants into the study

   i. Was selection into the study (or into the analysis) unrelated to intervention or unrelated to outcome?

      □ Not applicable
      □ Yes
      □ Probably yes
      □ Probably no
      □ No
      □ No information

   ii. Do start of follow-up and start of intervention coincide for most participants?

      □ Not applicable
      □ Yes
      □ Probably yes
      □ Probably no
      □ No
      □ No information

   iii. Were adjustment techniques used that are likely to correct for the presence of selection biases?

      □ Not applicable
      □ Yes
      □ Probably yes
      □ Probably no
      □ No
      □ No information

   iv. Is the allocation mechanism appropriate to generate equivalent groups?

      □ Not applicable
      □ Yes
      □ Probably yes
      □ Probably no
      □ No
      □ No information

v. Risk of bias judgement

- ☐ Low
- ☐ Moderate
- ☐ Serious
- ☐ Critical
- ☐ No information

2. Bias due to confounding

i. Did the authors use an appropriate analysis method that controlled for all the important confounding areas (=baseline confounding)?

- ☐ Not applicable
- ☐ Yes
- ☐ Probably yes
- ☐ Probably no
- ☐ No
- ☐ No information

ii. Did the authors use an appropriate analysis method that controlled for time-varying confounding, if present (=time-varying confounding)?

- ☐ Not applicable
- ☐ Yes
- ☐ Probably yes
- ☐ Probably no
- ☐ No
- ☐ No information

iii. Were confounding areas that were controlled for measured validly and reliably by the variables available in this study?

- ☐ Not applicable
- ☐ Yes
- ☐ Probably yes
- ☐ Probably no
- ☐ No
- ☐ No information

iv. Risk of bias judgement

- ☐ Low
- ☐ Moderate

- Serious
- Critical
- No information

3. Bias in measurement of interventions

   i. Is the intervention well defined?

      - Not applicable
      - Yes
      - Probably yes
      - Probably no
      - No
      - No information

   ii. Was the information used to define intervention groups recorded at the start of the intervention?

      - Not applicable
      - Yes
      - Probably yes
      - Probably no
      - No
      - No information

   iii. Was information on intervention status unaffected by knowledge of the outcome or risk of the outcome?

      - Not applicable
      - Yes
      - Probably yes
      - Probably no
      - No
      - No information

   iv. Risk of bias judgement

      - Low
      - Moderate
      - Serious
      - Critical
      - No information

4. Bias in measurement of outcomes

i. Was the outcome measure objective?

- ☐ Not applicable
- ☐ Yes
- ☐ Probably yes
- ☐ Probably no
- ☐ No
- ☐ No information

ii. Were the methods of outcome assessment comparable across intervention groups?

- ☐ Not applicable
- ☐ Yes
- ☐ Probably yes
- ☐ Probably no
- ☐ No
- ☐ No information

iii. Were outcome assessors unaware of the intervention received

- ☐ Not applicable
- ☐ Yes
- ☐ Probably yes
- ☐ Probably no
- ☐ No
- ☐ No information

iv. Risk of bias judgement

- ☐ Low
- ☐ Moderate
- ☐ Serious
- ☐ Critical
- ☐ No information

5. Bias due to departures from intended interventions

i. Were important co-interventions balanced across intervention

- ☐ Not applicable
- ☐ Yes
- ☐ Probably yes
- ☐ Probably no

- No
- No information

ii. Did study participants adhere to the assigned intervention regimen?

- Not applicable
- Yes
- Probably yes
- Probably no
- No
- No information

iii. Was the intervention implemented successfully for most participants?

- Not applicable
- Yes
- Probably yes
- Probably no
- No
- No information

iv. Risk of bias judgement

- Low
- Moderate
- Serious
- Critical
- No information

6. Reporting bias

i. Missing data

- Were incomplete outcome data adequately addressed?
    a. Not applicable
    b. Yes
    c. Probably yes
    d. Probably no
    e. No
    f. No information
- Were no participants excluded due to missing data on intervention status or other variables needed for the analysis (e.g. confounders that were controlled for in the analysis)?
    a. Not applicable

b. Yes
c. Probably yes
d. Probably no
e. No
f. No information

- Risk of bias judgement
  a. Low
  b. Moderate
  c. Serious
  d. Critical
  e. No information

ii. Selective outcome reporting

- Is the study free from selective outcome reporting?
  a. Not applicable
  b. Yes
  c. Probably yes
  d. Probably no
  e. No
  f. No information
- Risk of bias judgement
  a. Low
  b. Moderate
  c. Serious
  d. Critical
  e. No information

7. Hawtorne effects

i. Are differences in outcomes across groups not influenced by participant motivation as a result of programme implementation and, or monitoring?

- Not applicable
- Yes
- Probably yes
- Probably no
- No
- No information

8. Statistical method

i. Was an adequate statistical method being used?

- Not applicable
- Yes
- Probably yes
- Probably no
- No
- No information

9. Other bias

   i. Was the study free from other risks of bias due to problems not covered above?

   - Not applicable
   - Yes
   - Probably yes
   - Probably no
   - No
   - No information

10. Overall risk of bias judgement

    - Low
    - Moderate
    - Serious
    - Critical
    - No information

Appendix 8: Risk of bias tool used for qualitative studies

1. Q1: Was there a clear statement of the aims of the research?

i. What the goal of the research was
ii. Why is it important
iii. Its relevance

2. Q2: Is a qualitative methodology appropriate?

i. If the research seeks to interpret or illuminate the actions and/or subjective experiences of research participants

3. Q3: Was the research design appropriate to address the aims of the research?

i. If the researcher has justified the research design (e.g. have they discussed how they decided which method to use)?

4. Q4: Was the recruitment strategy appropriate to the aims of the research?

i. If the researcher has explained how the participants were selected
ii. If they explained why the participants they selected were the most appropriate to provide access to the type of knowledge sought by the study
iii. If there are any discussions around recruitment (e.g. why some people chose not to take part)

5. Q5: Was the data collected in a way that addressed the research issue?

i. If the setting for data collection was justified
ii. If it is clear how data were collected (e.g. focus group, semi-structured interview etc.)
iii. If the researcher has justified the methods chosen
iv. If the researcher has made the methods explicit (e.g. for interview method, is there an indication of how interviews were conducted, or did they use a topic guide)?
v. If methods were modified during the study. If so, has the researcher explained how and why?
vi. If the form of data is clear (e.g. tape recordings, video material, notes etc.)
vii. If the researcher has discussed saturation of data

6. Q6: Has the relationship between researcher and participants been adequately considered?

i. If the researcher critically examined their own role, potential bias and influence during: Formulation of the research questions
ii. If the researcher critically examined their own role, potential bias and influence during: Data collection, including sample recruitment and choice of location
iii. How the researcher responded to events during the study and whether they considered the implications of any changes in the research design

7. Q7: Have ethical issues been taken into consideration?

i. If there are sufficient details of how the research was explained to participants for the reader to assess whether ethical standards were maintained
ii. If the researcher has discussed issues raised by the study (e.g. issues around informed consent or confidentiality or how they have handled the effects of the study on the participants during and after the study)
iii. If approval has been sought from the ethics committee

8. Q8: Was the data analysis sufficiently rigorous?

i. If there is an in-depth description of the analysis process
ii. If thematic analysis is used. If so, is it clear how the categories/themes were derived from the data?
iii. Whether the researcher explains how the data presented were selected from the original sample to demonstrate the analysis process
iv. If sufficient data are presented to support the findings
v. To what extent contradictory data are taken into account
vi. Whether the researcher critically examined their own role, potential bias and influence during analysis and selection of data for presentation

9. Q9: Is there a clear statement of findings?

i. If the findings are explicit
ii. If there is adequate discussion of the evidence both for and against the researcher's arguments
iii. If the researcher has discussed the credibility of their findings (e.g. triangulation, respondent validation, more than one analyst)
iv. If the findings are discussed in relation to the original research question

10. Q10: How valuable is the research?

i. If the researcher discusses the contribution the study makes to existing knowledge or understanding e.g. do they consider the findings in relation to current practice or policy, or relevant research-based literature?
ii. If they identify new areas where research is necessary
iii. If the researchers have discussed whether or how the findings can be transferred to other populations or considered other ways the research may be used

Appendix 9: List of excluded database studies with reason of exclusion

Study	Reason for exclusion
Addo-Yobo 2006	Intervention (WASH intervention)
Adenya 2009	Study Design
Adomako 2008	Study Design
Afroz 2010	Intervention (promotional approach)
Aguilar 2007	Intervention (promotional approach)
Ahmed 1993	Outcome
Ahmed Nasar 1991	Study Design
Aithal 2014	Intervention (promotional approach)
Akhter 2012	Study Design
Akpabio 2012	Intervention (promotional approach)
Akter (1) 2014	Outcome
Akter (2) 2014	Study Design
Akter 2015	Outcome
Akuokoasibey 1994	Study Design
Alexander 2013	Outcome
Alexander 2012	Study Design
Allison 2002	Study design
Almazan 2014	Study Design
Almedom 1995	Outcome
Alvarez 1982	Study Design
Anon	Study Design
Arnold 2010	Study Design
Asekun-Olarinmoye 2014	Study Design
Ashutosh 2015	Study Design
Aunger 2014	Study Design
Azeredto	Intervention (promotional approach)
Babar 2014	Outcome
Baer 2015	Study Design
Banana 2015	Study Design
Banu 2013	Intervention (promotional approach)
Barrett 1996	Intervention (promotional approach)
Bellissimo-Rodrigues 2015	Study Design
Bennett 2015	Intervention (WASH intervention)
Bility 1997	Outcome
Bilqis 1994	Study Design
Binayak 2014	Intervention (WASH intervention)
Biran 2012	Study Design
Biran 2014	Study Design
Bisung 2015	Study Design

Biswas 1990	Study Design
Bohari 1989	Study Design
Boisson 2014	Study Design
Bolt 2004	Study Design
Borja 2014	Intervention (promotional approach)
Borzekowski 2015	Study Design
Bowen 2007	Outcome
Bulled 2015	Study Design
Cairncross 2005	Study Design
Chase 2015	Outcome
Clasen 2012	Outcome
Clasen 2014	Outcome
Clemens 1987	Intervention (promotional approach)
Contzen 2013	Study Design
Contzen 2015	Outcome
Curtis 2001	Study Design
Curtis 2003	Intervention (promotional approach)
Curtis 2011	Study Design
Diallo 2007	Study Design
Dieleman 1998	Study Design
Dobe 2011	Study Design
Donaldson	Intervention (WASH intervention)
Dreibelbis 2014	Outcome
Dreibelbis 2016	Study Design
Eder	Outcome
Egunjobi 1988	Study Design
Erhard 2013	Outcome
Espinoza	Not available
Evans 1987	Study Design
Flóres Munoz	Study Design
Gadgil 2011	Intervention (promotional approach)
Garg 2013	Study Design
Garn 2013	Outcome
Gungoren 2007	Outcome
Haapala 2015	Outcome
Hadi 2000	Intervention (WASH intervention)
Harrison 2012	Population
Hartinger 2011	Outcome
Harvey 2009	Study Design
Hollander 1997	Study Design
Hoque 1994	Outcome
Hoque 1995	Intervention (promotional approach)

Huda 2010	Study Design
Hueso 2013	Outcome
Huttly 1998	Intervention (promotional approach)
Improgo	Study Design
Indira 2007	Study Design
Islam 1992	Study Design
Ismail 2009	Study Design
Ittiravivongs 1992	Intervention (promotional approach)
Jannat 2013	Study Design
Jenkins 2005	Outcome
Jenkins 2007	Outcome
Jensen 2005	Study Design
Jimenez 2014	Outcome
Jorgensen 1994	Study Design
Jos 2014	Study Design
Joseph 2014	Study Design
Kaltenthaler (3) 1996	Intervention (WASH intervention)
Kaltenthaler (1) 1996	Intervention (promotional approach)
Kaltenthaler (2) 1996	Outcome
Kariuki 2012	Study Design
Katsi 2008	Outcome
Kaur 2013	Population
Kidanu 2009	Outcome
Kifanyi 2013	Study Design
King 1994	Study Design
Kingery 2016	Outcome
Kleiman 2004	Intervention (promotional approach)
Kuberan 2015	Intervention (promotional approach)
Kumar 2010	Study Design
Kumar 2013	Study Design
Kwashie 2007	Study Design
Kwiringira 2014	Intervention (promotional approach)
Lagerkvist 2014	Intervention (promotional approach)
Lahariya 2014	Study Design
Lane 1992	Study Design
Lang 2012	Study Design
Lare-Dondarini 2015	Intervention (promotional approach)
Lawrence 2014	Study Design
Lawton 2006	Population
Le 2012	Outcome
Lee 1995	Intervention (promotional approach)
Lenneiye 2000	Study Design

Li 2015	Study Design
Liebler	Not available
Lifebuoy: help a child reach 5 (2015)	Study Design
Lindquist 2014	Intervention (WASH intervention)
Loevinsohn 2015	Outcome
Loughnan 2015	Duplicate
Loughnan 2015	Intervention (promotional approach)
Lovatto	Population
Luby (2) 2001	Outcome
Luby (1) 2001	Study Design
Luby 2004	Outcome
Luby 2005	Outcome
Luby 2006	Outcome
Luby 2007	Outcome
Luby 2009	Intervention (promotional approach)
Mahadik 1983	Intervention (promotional approach)
Malhotra 2008	Population
Manikutty 1997	Intervention (WASH intervention)
Manoharan 2005	Study Design
Manothu 2010	Population
Manun-Ebo 1997	Study Design
Martinez 1982	Intervention (WASH intervention)
Massie 2013	Intervention (promotional approach)
Mathew 2014	Duplicate
Mathew 2014	Study Design
Mazeau 2014	Study Design
Mbatha 2011	Intervention (promotional approach)
McConville 2011	Study Design
McConville 2014	Study Design
McGranahan 2015	Study Design
Meddings 2004	Intervention (promotional approach)
Mello 1998	Intervention (promotional approach)
Mello 2014	Intervention (promotional approach)
Mello Dalva	Duplicate
Menaruchi	Intervention (promotional approach)
Mensah 2006	Intervention (WASH intervention)
Metwally 2007	Study Design
Miller-Petrie 2016	Outcome
Mogaji 2015	Study Design
Mohapatra 2015	Study Design
Moisés	Study Design
Moises 2010	Duplicate

Monney 2013	Intervention (promotional approach)
Monreal	Intervention (promotional approach)
Montgomery 2007	Study Design
Montgomery 2009	Study Design
Montgomery 2012	Outcome
Morais 1983	Intervention (WASH intervention)
Morante	Not available
Morgan 1982	Study Design
Mozar 2010	Study Design
Mtungila 2009	Study Design
Mugambe 2013	Outcome
Mugisha 2009	Outcome
Mugure 2009	Intervention (promotional approach)
Mujeeb 2004	Study Design
Mukungu 2000	Study Design
Muller 1988	Study Design
Muller 2000	Study Design
Munkhondia 2013	Study Design
Murda 1985	Study Design
Murray 2011	Intervention (WASH intervention)
Murthy 1990	Intervention (promotional approach)
Musabayane 2000	Study Design
Musara 2001	Study Design
Mushtaq 2008	Intervention (promotional approach)
Musuva 2014	Study Design
Muttamara 1986	Study Design
Mwanga (1) 2013	Outcome
Mwanga (2) 2013	Study Design
Mwanga 2015	Study Design
Mwangi 2000	Study Design
Mwendera 2006	Outcome
Nakagiri 2015	Intervention (promotional approach)
Nanan 2003	Outcome
Naranjo 2010	Outcome
Ndejjo 2014	Study Design
Ndiaye 2010	Outcome
Nedjoh 2008	Study Design
Nelson 2008	Intervention (promotional approach)
Nelson 2014	Outcome
Neves	Population
Ngondi 2010	Study Design
Nicaragua Ministerio de Salud	Not available

Nicholson 2014	Outcome
Niedrum 1994	Study Design
Nikiforov 2012	Not available
Nilanjana 2009	Study Design
Nilika 2008	Study Design
Nizame 2011	Not available
Nizame 2012	Study Design
Nizame 2013	Intervention (promotional approach)
Norman 2011	Intervention (WASH intervention)
Noy 2009	Outcome
Ntozini 2015	Study Design
Nwozor 2009	Study Design
Nyp 2013	Study Design
Nzengya 2015	Study Design
Obeng 2013	Study Design
Obono 2007	Study Design
Obrist 2006	Intervention (WASH intervention)
O'Connell 2015	Intervention (promotional approach)
Ocwieja 2009	Intervention (promotional approach)
Ogunjobi 2009	Study Design
O'Keefe (1) 2015	Study Design
O'Keefe (2) 2015	Intervention (promotional approach)
Okurut 2014	Intervention (promotional approach)
Oladepo 1991	Intervention (promotional approach)
Oliveira 2015	Population
O'Loughlin 2006	Study Design
Omar 1993	Study Design
Omishakin 1986	Intervention (promotional approach)
Opryszko 2010	Intervention (WASH intervention)
O'Reilly 2008	Intervention (WASH intervention)
O'Reilly 2014	Intervention (promotional approach)
O'Reilly 2015	Outcome
Oswald 2008	Study Design
Oswald 2014	Intervention (promotional approach)
Ouedraogo 2002	Study Design
Owusu 2009	Study Design
Ozcelik 2014	Outcome
Palavalasa 2012	Study Design
Palmeirim 2015	Study Design
Pan 2015	Intervention (promotional approach)
Pandve 2011	Study Design
Parahakaran 2010	Intervention

Park 2015	Intervention (WASH intervention)
Patel 2012	Study Design
Pattanayak 2010	Outcome
Pengpid 2012	Study Design
Perks 2005	Study Design
Pfadenhauer 2015	Outcome
Phaswana-Mafuya 2005	Intervention (promotional approach)
Phaswana-Mafuya 2006	Duplicate
Phaswana-Mafuya 2006	Intervention (promotional approach)
Phaswana-Mafuya 2008	Intervention (promotional approach)
Phiri 2001	Study Design
Pick 2011	Study Design
Pickering 2011	Study Design
Pickering 2014	Study Design
Quintanilla 2014	Duplicate
Quispe	Not available
Ram 2010	Study Design
Ram 2015	Outcome
Rheinlander 2010	Outcome
Riley	Intervention (WASH intervention)
Rincon	Not available
Rodgers 2007	Study Design
Roma 2010	Study Design
Rosenfeld 2009	Study Design
Rotondo 2009	Study Design
Routh 2014	Study Design
Routray 2015	Outcome
Russo 2012	Population
Sagerman 2011	Outcome
Sah 2009	Study Design
Salem	Not available
Salmon 2011	Outcome
Sara 2014	Outcome
Sarker 2007	Outcome
Schmitz 2013	Population
Schmitz 2014	Duplicate
Scott 2007	Outcome
Scott 2008	Study Design
Senyonjo 2014	Study Design
Shahid 1996	Outcome
Shibabaw 2009	Study Design
Shordt 1996	Study Design

Sibiya 2013	Intervention (promotional approach)
Silali 2014	Outcome
Simmerman 2011	Population
Simplicity-the key to sanitation sustainability 2013	Study Design
Simpson-Hébert	Study Design
Sinanovic 2005	Study Design
Singh 2004	Population
Sircar 1987	Outcome
Smita 2001	Not available
Smith 2004	Outcome
Sonego 2014	Intervention (promotional approach)
Stanton 1988	Outcome
Swami 2004	Study Design
Taha 2000	Outcome
Talaat 2011	Outcome
Tao 2013	Intervention (promotional approach)
Tapas 2008	Study Design
Thieme 2010	Intervention (promotional approach)
Thys 2015	Intervention (promotional approach)
Toledo	Outcome
Tonon 1980	Study Design
Toubali 2012	Study Design
Trinies 2014	Study Design
Tumwebaze 2014	Intervention (promotional approach)
Unicomb 2013	Study Design
Uptake of handwashing.... 2012	Outcome
Vashi 2008	Intervention (promotional approach)
Vigil	Study Design
Wamalwa 2005	Outcome
Wang 2009	Not available
Waterkeyn 2005	Study Design
Waterman 1988	Study Design
Wendo 2003	Study Design
Westaway 1998	Study Design
Whiteside 1991	Study Design
WHO (Appropriate sanitation for very low income communities)	Study Design
WHO (Marketing hygiene behaviours)	Study Design
Wibowo 2010	Study Design
Wilson 1986	Outcome
Wilson 1993	Study Design

Wolfson 1987	Study Design
Xuan Le 2013	Study Design
Yacoob 1994	Study Design
Yahaya 2004	Study Design
Yeager 1999	Intervention (promotional approach)
Yemane 2013	Intervention (promotional approach)
Yimenu 2009	Study Design
Yusuf 1990	Intervention (promotional approach)
Zakiya 2014 (1)	Study Design
Zakiya 2014 (2)	Study Design
Zimmerman 2013	Study Design
Zulu 2009	Study Design

Appendix 10: List of excluded grey literature studies with reason of exclusion

Study	Reason for exclusion
Appave 2009	Intervention
Appleton 2005	Study design
Atuhairwe 2012	Study design
Baby 2012	Study design
Beale 2015	Study design
Beesley 2016 (1)	Study design
Beesley 2016 (2)	Study design
Biran 2003	Study design
Biswas 2015	Study design
Cairncross 2006	Study design
Cameron 2013	Study design
Care International Kenya 2010	Study design
Carrard 2009	Intervention
Census of India 2011	Study design
Chatterley 2013	Study design
Coffey 2015	Study design
Contzen 2012	Study design
Cumming 2012	Study design
Current DMI projects in DRC 2015	Intervention
Das 2015	Study design
Devine 2010	Study design
Dutton 2011	Study design
Evans 2009	Study design
Favin 2004	Study design
Favin 2011	Study design
Fawzi 2011	Study design
Feng 2011	Intervention
Galiani 2010	Study design
Galiani 2014	Duplicate
Galvin 2013	Outcome
Gautam 2010	Intervention
Geissler 2012	Outcome
Ghosh 2014	Intervention
Graf 2014	Study design
Heierli 2007	Study design
Heijnen 2015	Study design
Hueso 2013 (1)	Study design
Hueso 2013 (2)	Study design
Hueso 2013 (3)	Study design
iDE Cambodia	Study design

IRC 2015 (1)	Study design
IRC 2015 (2)	Study design
IRC 2015 (3)	Study design
IRC 2015 (4)	Study design
IRC 2015 (5)	Study design
IRC 2015 (6)	Study design
IRC 2015 (7)	Study design
Jacimovic 2014	Study design
Jenkins 2009	Study design
Jones 2009	Intervention
Kabir 2008	Study design
Kabir 2010 (1)	Intervention
Kabir 2010 (2)	Intervention
Khanna 2006	Intervention
Kleinau 2004	Study design
Kulkami 2013	Study design
Lennon 2011	Outcome
Lusambili 2011	Intervention
Malebo 2012	Study design
Mander 2014	Study design
Massey 2011	Outcome
Matthewson 2007	Study design
McGranahan 2013	Study design
Mclntyre 2014	Study design
Mclntyre 2015	Study design
Mishra 2015	Study design
Morgan 2013	Study design
Mulenga 2011	Study design
Murray 2015	Study design
Nalivata 2008	Intervention
Nkurunziza 2013	Outcome
Parry 2010	Study design
Pedi 2011	Study design
Perez 2013	Study design
Potter 2013	Study design
Quazi 2004	Intervention
Reed 2013	Study design
Reed 2014	Study design
Saadé 2001	Study design
Saywell 1999	Study design
Sémiond 2005	Study design
Shah 2013	Study design

Shrestha 2011	Study design
Sijbesma 2015	Study design
Simiyu 2015	Study design
Snehalatha 2015	Study design
Steinmann 2014	Study design
UKaid 2013	Study design
UNICEF 2003	Study design
UNICEF 2009	Study design
UNICEF 2013	Study design
United Nations International Research Institute for the Advancement of Women (INSTRAW) 1986	Study design
Veronese	Intervention
Vujcic 2014	Outcome
Water and Sanitation Program 2014	Study design
WaterAid 2011	Intervention
WaterAid 2012	Intervention
WaterAid Ethiopia 2004	Study design
WaterSHED-Asia 2010	Outcome
Wei 2014	Study design
Weiss 2013	Study design
Wicken 2008	Study design

Appendix 11: Barriers and facilitators in the category "Process evaluation factors", including quotes from qualitative studies

Process evaluation factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		ACCEPTABILITY		
Barriers		Habits "… in the case that someone didn't have good hygiene, they might be bothered to have a visit by a health promotor…" (AS, Andrade, 2013, p143) "…these people are used to doing it this way, and they don't want to change their custom." (PE, Andrade, 2013, p.145) Mindset "...another limitation, which might crop up at any time, is the mindset of rural communities to demand free or subsidized latrine materials and construction…" (AS, Malebo et al., 2012, p.60)		Safety risk "…the acceptability of the children's rally was questioned by a couple of school principals in light of the potential safety risk of children walking through the streets." (AS, Rajaraman et al., 2014, p.4)
Facilitators				Entertainment "Perceptions of the intervention team were also favourable, being viewed as polite and entertaining." (AS, Rajaraman et al., 2014, p.3) Cooperation "[the intervention team] cooperated completely with us, and made the programme very successful…" (PE, Rajaraman et al., 2014, p.3)
		DOSE		
Barriers	Long messages "…There were some challenges with the message design, the main complaint being that messages were too long…" (AS, O'Donnell, 2015, p.23) Short programme duration "…however, they do not always wash regularly, so we need more time because the children easily forget…" (PE, Xuan et al., 2014, p.8)	Short programme duration "…short period of planning and project implementation…critical challenge especially for realization of objectives…" (AS, Bruck and Dinku, 2008, p.29) Follow-up "…health education and health workers teachings are ineffective due to …the overall lack of follow up after the meeting." (AS, Malebo et al., 2012, p.41) "The second key issue is that it does not matter what type of programme is conducted in an area, unless		Long messages "The intervention promoters felt that the language for the pledge was too long…" (AS, Rajaraman et al., 2014, p.4)

Process evaluation factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		follow-up visits are performed periodically,…" (AS, Whaley and Webster, 2011, p.33)		
Facilitators	Intervention duration "…they mentioned longer intervention periods with more frequent reminders are necessary to change children's habits." (AS, Xuan et al., 2014, p.8) "…however, they do not always wash regularly, so we need more time because the children easily forget…" (PE, Xuan et al., 2014, p.8)	Relevant messages "….catalyzing change was the way that they tailored their messages to have relevance for the situation…" (AS, Andrade, 2013, p.145) Step-wise approach "…well they have been teaching them, and with ease they have been learning little by little…" (PE, Andrade, 2013, p.146) "…that little by little they are instilling in them these great values to be more hygienic…" (PE, Andrade, 2013, p.154) Visit frequency "…those people with less understanding, right, they try to visit them more…" (PE, Andrade, 2013, p.146) "…health promotors come to their homes regularly to check and see if they are complying…" (AS, Andrade, 2013, p.154) "…they have always asked us to do it and they always come by to check…" (PE, Andrade, 2013, p.154) "…whether organization returns to community for support visits. This was seen as very important…" (AS, Whaley and Webster, 2011, p.28) "…I personally think if those Plan [International] guys had come back and motivated people and encouraged them, then we would have done it…" (PE, Whaley and Webster, 2011, p.28) External visit "…most stressed need for periodic visits from outsiders to ensure people keep up good practices." (AS, Whaley and Webster, 2011, p.28)		Visit frequency "Women explained that it was helpful to have someone remind them, during the first month, when they were most likely to forget." (PE, Langford and Panter-Brick, 2013, p.137)

Process evaluation factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Broad approach "…and that the broad approach, greater detail and regular structure of the health clubs was a preferred method." (AS, Whaley and Webster, 2011, p.34)		
		Regular structure "…and that the broad approach, greater detail and regular structure of the health clubs was a preferred method." (AS, Whaley and Webster, 2011, p.34)		
		Verbal information "…But when we just inform verbally or by giving an example (bng truyn)…we can't know if they actually change." (PE, Rheinländer et al., 2012, p.608)		
ENGAGEMENT				
Barriers	Lack of enthusiasm "…input from outside 'experts' was light: the most significant finding from this study is that the enthousiasm that carried the project forward was largely internally generated." (AS, Lansdown et al., 2002, p.432)	Habits "A few respondents did not give up old, unhealthy habits in spite of having the financial ability to implement new practices." (AS, Akter and Ali, 2014, p.7)	Lack of communication "Being unclear as to which area a latrine business is supposed to cover or finding that one business covers less area than another leads to frustration among latrine business owners." (AS, Emerging Markets Consulting, 2014, p.27)	
	Lack of interest "…there is also a lack of interest from the family." (PE, Xuan et al., 2014, p.8)	Personal career of the implementer "…officers preferred to invest efforts in programmes they knew could be successful." (AS, Hueso and Bell, 2013, p.11)		
		Overlap with other programmes "Finally, there may be overlap with other programs that might interfere with CLTS operation." (AS, Lawrence et al., 2016, p.559)		
		Lack of follow-up "Because you can see partners come and do a project just for something like three months, then they go leaving the people on their own." (PE, Whaley and Webster, 2011, p.33)		
Facilitators		Enthusiasm "The women members of VDCs were found to be very enthusiastic involved in different programs of village development…" (AS, Sarker and Panday, 2007, p.26)		

Process evaluation factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		"…community leaders and peer educators enthusiastically continuing the education sessions beyond the anticipated length of the project." (AS, Smith et al., 2004, p.67)		
		Income generating activities "The main interesting issue that motivated people to come to the health clubs was the fact that there was a point when it was said that there would be a time when income generating projects would be introduced." (PE, Whaley and Webster, 2011, p.28)		
		Leadership "The Anganwadi workers, supervisors and teachers played an important role in motivating and exhorting women to participate in the campaign." (AS, Pardeshi, 2009, p.83)		
		Praise "A large motivating factor for performing hygiene behaviors is the praise they receive and the recognition of having a pretty home." (AS, Andrade, 2013, p.144)		
FIDELITY				
Barriers				School closures "…it was missed on at least one day in 6 of the 7 villages, because of school closures due to holidays, weather or teachers' meetings." (AS, Rajaraman et al., 2014, p.5)
REACH				
Barriers			Small scale of the intervention "…The organization is not interested in offering individual sanitation loans because there are too small and will not reach very poor populations." (AS – Emerging Markets Consulting, 2014, p.31)	

Process evaluation factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
Facilitators	Intention "…however, few could specify all the steps, although most intended to read the leaflet at home." (AS, Yeager et al., 2002, p.768)	Motivation "…many people were motivated and majority adopted improved technology as there was increased demand for improved latrine." (PE, Malebo et al., 2012, p.42)		
SATISFACTION				
Barriers	Lack of interaction "Interestingly, teachers who applied only passive methods were observed to be dissatisfied with this type of sessions." (AS, Xuan et al., 2013, p.7) "My expectation was not met because there was no response from the schoolchildren." (PE, Xuan et al., 2013, p.7)	Lack of collaboration "I just advocate and guide by my own way. It's not enough! I really want somebody else to come here. Somebody who knows more than me…" (PE, Rheinländer et al., 2012, p.608) "the actions of Oxfam, ZimbabweAHEAD's partner organization in Chiredzi district, appeared to go against the objectives of the CHCs …" (AS, Whaley and Webster, 2011, p.33)	Inappropriate attitude of the implementer "…one loan officer said that the previous sanitation teacher had been hard to deal with; his manner and language towards villagers was not appropriate…" (AS, Emerging Markets Consulting, 2014, p.27)	
		Lack of privacy "…Respondents were concerned about the lack of privacy during open defecation." (AS, Akter and Ali, 2014, p.6)		
		Criticism "Some VHWs also felt unappreciated by authorities who criticized them for not achieving improved sanitation despite their effort…" (PE, Rheinländer et al., 2012, p.608)	Repayment method and process time "…they were not satisfied with the interest rate…loan processing times were slow, which also delayed the delivery of latrines." (AS, Emerging Markets Consulting, 2014, p.35)	
		Effectiveness "Some communal health staff were also frustrated that RHSP did not show enough results…" (PE, Rheinländer et al., 2012, p.608)		

Process evaluation factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Cost "People hated me because I was telling them that they needed to pay some money for the water." (PE, Kiwanuka et al., 2015, p.101) Lack of training of the implementer "…lack of training in participatory development methods was an obstacle for implementing the TSC…" (AS, Hueso and Bell, 2013, p.10) "The majority of VHWs felt that they had inadequate knowledge, skills and mandate to educate villagers…" (AS, Rheinländer et al., 2012, p.607-608)		
		Politics "During campaign season some politicians come in and want to influence priorities for boreholes because they want votes. They ask "why isn't this borehole taken to this place (their own area)? And they push to get more boreholes in their areas which causes to lack of trust and morale among the people." (AS, Kiwanuka et al., 2015, p.103-104)		
		Lack of communication "we don't even know how it was decided, whether it was decided by Oxfam officials, we don't even know why some people got them and other didn't." (PE, Whaley and Webster, 2011, p.33)		
Facilitators	Interaction "Observations showed that all teachers who applied active methods in the HWWS sessions responded positively and were happy about teaching with the new methods…" (AS, Xuan et al., 2013, p.7)	Training/qualification of the implementer "Most focus group participants felt confident in the health promoters' training, competence, and ability to make change." (AS, Andrade, 2013, p.126) "Many respondents appreciated the fact that artisans and animators were trained and empowered with	Participation "…The latrine business owner in Takeo reported that his sales had increased by 100% after joining the program." (AS, Emerging Markets Consulting 2014, p.19)	Design of the hardware "Both the 40-litre bucket and the kitchen bucket were brightly coloured, and installed complete with a water receptacle and a stool to place the bucket upon. Users reported that these features made these handwashing stations attractive." (AS, Hulland et al., 2013, p.8)

Process evaluation factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
	"The exercise went beyond my expectation as they (schoolchildren) understood quickly, and were active and gave true answers too." (PE, Xuan et al., 2013, p.7) "In comparison to the usual approach adopted by the MoH, they described it as being more participatory, allowing greater dialogue between themselves and the trainers…" (AS, Yeager et al., 2002, p.767)	skills to construct latrines…" (AS, Malebo et al., 2012, p.51)	Collateral benefit "Interestingly, clients in Takeo said they were happy with the group guarantee method because it meant they did not need to provide collateral when borrowing." (AS, Emerging Markets Consulting, 2014, p.34-35)	"All of my family likes the bucket handwashing station because after washing hands the waste water is stored in the bowl, and the handwashing station doesn't get muddy underneath." (PE, Hulland et al., 2013, p.8)
	Innovation "The soap opera style of the video was considered very innovative…" (AS, Yeager et al., 2002, p.767)	Respect "Maybe somebody's house isn't cleaned up, the patio, I like for them to tell me: look how nice it is to have mud, right. It makes you happy that they say that you have your house ordered…to have it pretty. And that is what they like for them to say, right?" (PE, Andrade, 2013, p.144)		
		Feeling proud "Yes, at least they say to them: congratulations because everything is very clean and you feel proud that they are seeing and that you are doing what they tell you." (PE, Andrade, 2013, p.151)		

AS: author statement; PE: primary evidence

Statements in red are originating from qualitative studies with a CASP-score < 8

Appendix 12: Barriers and facilitators in the category "Programme environment factors", including quotes from qualitative studies

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
TRAINING MATERIALS				
Barriers	**Safety risk** "Three schools also complained that health education materials were stolen by villagers." (AS, Lansdown 2002, p.429)	**Availability** "…a lack of detailed instructions to guide the construction of Tippy Taps and a perceived lack of materials." (AS, Brooks et al., 2015, p.389)	**Availability** "…challenges include the limited availability of marketing materials." (AS, Emerging Markets Consulting, 2014, p.19)	**Availability** "A second challenge was printing localized intervention posters with photos of village leaders endorsing HWWS." (AS, Rajaraman, et al., 2014, p.4) **Cultural insensitivity** "Because bodnas are traditionally used for anal cleansing after defecation, using it as a multipurpose handwashing station rendered this design unacceptable in both urban and rural sites." (AS, Hulland et al., 2013, p.8)
Facilitators	**Availability** "… buckets, WaterGuard and soap were often cited as necessary elements for a successful intervention." (AS, Graves et al., 2013, p.166)	**Availability** "For some, additional factors preventing latrine construction included insufficient access to necessary materials…" (AS, Lawrence et al., 2016, p.557) **Distribution** "Adapted guidelines for CLTS triggering had also been produced and distributed." (AS, Jimenez et al., 2014, p.1113)		
COMMUNITY CAPACITY				
Barriers	**(Lack of) dissemination** "…another insisted vehemently that it was improper for a child to teach his or her parents." (AS, Lansdown et al., 2002, p.429) "… a child whom I have given birth to, cannot teach me." (PE, Lansdown et al., 2002, p.429) "Community messages were often carried by children, but there were mixed results in terms of parental responses." (AS, Lansdown et al., 2002, p.431)	**Lack of accountability** "The line of accountability of WASHCOs, especially to their constituency, also appears not well established…" (AS, Bruck and Dinku, 2008, p.18) **Lack of support** "Moreover, the role of TSPs in hygiene and sanitation activities, such as in supporting the construction of latrines, is not clearly defined." (AS, Bruck and Dinku, 2008, p.20) **Lack of involvement** "…the evaluation team field visits found that the involvement of communities in developing hygiene promotion plans and in implementing and monitoring		

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		them was minimal." (AS, Bruck and Dinku, 2008, p.26) "There is a serious lack of involvement of the Education Office…" (AS, Bruck and Dinku, 2008, p.27) "In general, the full involvement of village and ward leaders had not been achieved, and there was room for improvement." (AS, Jimenez et al., 2014, p.1113)		
		Lack of capacity building "As a result of low capacity, village leaders received little training on sanitation software…Community participation was limited, if not absent." (AS, Hueso and Bell, 2013, p.6) "We do not have warmed welcoming and proper linkage of capacity building, among water stakeholders and the community households…" (PE, Silali and Njambi, 2014, p.14)		
		Paternalistic inertia "The paternalistic inertia thus challenged the foundations of the incentive-based and community-led TSC policy." (AS, Hueso and Bell, 2013, p.14)		
		(Lack of) sense of ownership "One of the NGOs found that a complication in involving the users is that they have become spoilt." (AS, Schouten and Mathenge, 2010, p.821) "In most of water and health programs in this division, we community owners are only called upon to implement projects…" (PE, Silali and Njambi, 2014, p.14)		
		Government-dominated stakeholders "Also, lowland and highland community members could not cite any informal village stakeholders being involved in any RHSP initiatives." (AS, Rheinländer et al., 2012, p.606)		
Facilitators	Dissemination "Some mothers believed that it was quite proper for a child to teach his or her mother…" (AS, Lansdown et al., 2002, p.429) "What [the children] are doing here, they are practicing it even at home." (AS, Graves et al., 2013, p.167)	Support "…many community members viewed the health promotors as a major source of instrumental support…" (AS, Andrade, 2013, p.123)		
		Dedication		

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
	"Then the information was disseminated to the parents and now the parents are also practicing what they saw in school." (PE, Graves et al., 2013, p.167)	"…and be dedicated to the hygiene and well-being of the community." (AS, Andrade, 2013, p.133) **Guiding** "They have the role of guiding and educating people of the community." (PE, Andrade, 2013, p.134) **Capacity building** "…but sensitization and capacity building are still needed to make a transition." (PE, Hueso and Bell, 2013, p.6) **Leadership** "…involvement had been high due to uncommon, high-quality government facilitation and village leadership." (AS, Hueso and Bell, 2013, p.6) "Unicef personnel attributed the success of water supply and sanitation projects in Ward 22 to effective community leadership." (AS, Katsi, 2008, p.396) "Using program leaders to teach the community health educators allowed critique and discussion of teaching styles by the project team and promoted the credibility of each leader." (AS, Smith et al., 2004, p.66) **Sense of ownership** "Community sensitization is a must to instil a sense of ownership and to build capacity…" (PE, Kiwanuka et al., 2015, p.102) "A sense of ownership means growing of collective feelings among the members of VDCs…" (AS, Sarker and Panday, 2007, p.25) "The NGOs find community involvement as an effective means to reduce the construction costs." (AS, Schouten and Mathenge, 2010, p.821) "A very strong sense of ownership of the process was found, with significant engagement of the staff including the DHO." (AS, Jimenez et al., 2014, p.1113) **Multiplier effect from parents to children** "I taught my children about it and now my eldest is always saying "Shouldn't we wash our hand now,		

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Mummy?" (PE, Langford and Panter-Brick, 2013, p.137) **Self-financial management capacity** "At the end of the financial year, each and every VDC calls a general meeting to discuss the annual income and expenditure before the general members." (AS, Sarker and Panday, 2007, p.25) "The practice of sharing of VDC resources among the members enhanced the integration and solidarity in the village." (AS, Sarker and Panday, 2007, p.25)		
FUNDING/RESOURCES				
Barriers		**Limited financial, technological, facilitation capacity** "The unprecedented increase of construction materials and labor coupled with the lack of construction materials…" (AS, Bruck and Dinku, 2008, p.29) "Funds were in general not sufficient to make specific follow-up visits." (AS, Jimenez et al., 2014, p.1115) "…they lamented that their monthly allowances from the government were so paltry and they consider this as a mockery." (AS, Katsi, 2008, p.396) "Another potential limiting factor in uptake and the sustainability of CLTS successes may be the human and financial resources…." (AS, Lawrence et al., 2016, p.559) "…due to lack of funds, we normally don't undertake hygiene and sanitation promotion activities…" (PE, Malebo et al., 2012, p.53) "…none of which have any sufficient financial, technological or facilitation capacity to take the approach forward as a programme." (AS, Malebo et al., 2012, p.60) "…hence limited and disintegrated resources for district, ward and village plans to support the MTUMBA approach." (AS, Malebo et al., 2012, p.52) "Once government took over the project, they increased the financial charge for communities,	**Limited financial, technological, facilitation capacity** "It views social loans as unsuccessful because they are more expensive than other loan products." (AS, Emerging Markets Consulting, 2014, p.32) "Sanitation loans are about US$50, which is too small." (PE, Emerging Markets Consulting, 2014, p.32) "This had led villagers to wait and see if they too could acquire a free latrine, making sales more difficult." (AS, Emerging Markets Consulting, 2014, p.20) "People tend to wait for free latrines and think they should not need to pay to defecate." (AS, Emerging Markets Consulting, 2014, p.27) "…which was beyond what most rural Zimbabweans could afford and greatly diminished the possibility of constructing a permanent latrine." (AS, Whaley and Webster, 2011, p.33)	

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		making it harder for communities to complete their contributions." (AS, Kiwanuka et al., 2015, p.103) "However, some obstacles were mentioned including inadequate budgets for allocation…" (AS, Malebo et al., 2012, p.52) "Representatives from the NGOs indicated that a major obstacle was the lack of consistent funding from donors." (AS, Schouten and Mathenge, 2010, p.820)		
		Payment modalities "Most of them requested upfront payment from clients….This system creates additional difficulties for the potential clients…" (AS, Jimenez et al., 2014, p.1115) "It is widely recognized, though, that incentives were disbursed upfront in most states, thus becoming a harmful pre-construction subsidy." (AS, Hueso and Bell, 2013, p.7) "Subsidy is an enormous waste of money. This money is literally being thrown down the loo." (AS, Hueso and Bell, 2013, p.7)	Late payments "…iDE is currently trying to resolve the issue of late payments…" (AS, Emerging Markets Consulting, 2014, p.28)	
Facilitators	Fundraising "Maybe talk to parents, maybe we can chip in – a few coins, if they have." (PE, Graves et al., 2013, p.166)	Financial assistance "Those who received BRAC's financial assistance believed that such support may have had a positive impact on their behavioral change." (AS, Akter and Ali, 2014, p.5)		
		Fundraising "The main sources of resource of VDCs are membership fee, collection of seasonal crops, and indirect support of partner NGOs." (AS, Sarker and Panday, 2007, p.24)		
		Use of local/traditional building materials "cost was not mentioned as a limiting factor as local and traditional building materials were used at little or no financial cost." (AS, Lawrence et al., 2016, p.558)		

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Affordability "Based on the options displayed at the sanitation centre, majority of households could afford." (PE, Malebo et al., 2012, p.37) "…majority of households preferred technology which is affordable…" (AS, Malebo et al., 2012, p.43) "The good thing with MUTUMBA initiative is the fact that, there are many latrine options with differing costs for a household to choose." (PE, Malebo et al., 2012, p.44) "…to reduce costs we use MTUMBA approach…." (PE, Malebo et al., 2012, p.55)		
		Income-generating activities "Under such circumstances, income-generating programs may be one of the alternative financial sources for VDC's…" (AS, Sarker and Panday, 2007, p.27)		
		Payment modalities "The monthly charge is good because we pay only once per month and it is cheaper than paying per visit." (PE, Schouten and Mathenge, 2010, p.821)		
INTENT OF A PROGRAMME TO CHANGE A SPECIFIC OUTCOME				
Facilitators		Mentality "People have to change their mentality or the way they act so that the community can change." (PE, Brooks et al., 2015, p.386)		
LEADERSHIP OF IMPLEMENTING ORGANIZATION				
Barriers		Decision making "Government officers and engineers, tasked with leading water and sanitation projects, neglected sanitation in favour of more stimulating and costly water projects." (AS, Hueso and Bell, 2013, p.10)		
		Collegial support "But none of those interviewed mentioned ever receiving collegial support or supervision by experts		

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		on these occasions." (AS, Rheinländer et al., 2012, p.608)		
Facilitators		Open discussion "Using program leaders to teach the community health educators allowed critique and discussion of teaching styles by the project team and promoted the credibility of each leader." (AS, Smith et al., 2004, p.66)		
PARTNERSHIP, COORDINATION BETWEEN PROVIDERS OF THE SAME INTERVENTION OR OTHER HEALTH INTERVENTIONS				
Barriers		Lack of partnerships between members "…there was a widespread perception that lack of financial means and partnerships prohibited members from addressing sanitation." (AS, Brooks et al., 2015, p.389)	Lack of communication "…Cos reported finding it difficult to communicate with WaterSHED staff…" (AS, Emerging Markets Consulting, 2014, p.20)	
		Lack of partnerships with government/NGO "…until now, we haven't found any partners or available government branches or representatives to help us with those activities." (PE, Brooks et al., 2015, p.389)	Lack of involvement "They were not very involved in promoting sanitation loans and were required only when there was a sanitation loan application…" (AS, Emerging Markets Consulting, 2014, p.26)	
		Lack of partnership with private sector "The virtual absence of the private sector to date indicates that there may be considerable potential to do more…" (AS, Bruck and Dinku, 2008, p.28)		
		Lack of intersectoral collaboration "…agricultural and health-related aspects, and technical and behavioral aspects, were rarely seen integrated…" (AS, Rheinländer et al., 2012, p.607) "We have not collaborated with any project or any other organizations on upgrading sanitation infrastructure…" (PE, Rheinländer et al., 2012, p.607) "In my daily work, I never have contact with the schools…" (PE, Rheinländer et al., 2012, p.607)		
		Lack of coordination		

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		"…integration and coordination of MWA programs with these activities was not evident…" (AS, Bruck and Dinku, 2008, p.20) "Unfavourable competition rather cooperation was identified to exist between health and water departments…" (AS, Malebo et al., 2012, p.53)		
		Lack of information "Beyond general informative meetings, the flow of information between the Water, Education and Health departments was poor in general…" (AS, Jimenez et al., 2014, p.1113) "NGOs implementing MTUMBA approach in the districts do not inform or report to the council about their work in the communities…" (AS, Malebo et al., 2012, p.53)		
		Lack of communication "…because those households with latrines which were accepted by Health Officers were not understanding as to why they have to improve or construct improved latrines…" (PE, Malebo et al., 2012, p.54) "Most of reports were health facility based not reflecting community issues whereby MTUMBA has been promoted and implemented." (AS, Malebo et al., 2012, p.53)		
		Limited quality of the implementers "The success of the MTUMBA approach is largely dependent on the quality and skills of the partners…the lack of good quality MTUMBA facilitators…could be a major limitation." (AS, Malebo et al., 2012, p.59)		
		Lack of responsibility "…a communal agricultural representative did not see personal hygiene and health-related messages as belonging to his area…" (AS, Rheinländer et al., 2012, p.607) "Those things are mainly the doctor's job. We haven't been trained for that." (PE, Rheinländer et al., 2012, p.607)		

Programme environment factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		"We don't have to go to the commune – we just work at the clinic." (PE, Rheinländer et al., 2012, p.607) "…who explained their responsibilities as mainly technical and not related to health issues." (PE, Rheinländer et al., 2012, p.607)		
Facilitators		Coordination "…use of designated staff to liaise and coordinate with woreda health offices helped integrate projects activities…" (AS, Bruck and Dinku, 2008, p.26) Decentralization "Decentralized systems are considered to be positive for encouraging innovation and customizing programmes to the local situations." (AS, Hueso and Bell, 2013, p.13) Partnerships with government "Clearly partnerships between government and local communities would likely deliver better results for sustainability." (AS, Kiwanuka et al., 2015, p.106)	Partnerships with government/NGO "…needs NGO partners before it can extend the program to other provinces…" (Emerging Markets Consulting, 2014, p.19) "Policy-level decisions and resulting action of NGOs on the ground affects the degree to which an approach succeeds." (AS, Whaley and Webster, 2011, p.28)	
TRAINING/QUALIFICATION OF THE IMPLEMENTERS				
Barriers	Lack of financial resources "…but the budget could have been more effectively allocated to invest in training…" (AS, O'Donnell, 2015, p.16)	Lack of financial resources "…this training was a revival of CBM, which had ceased to function due to lack of financial resources." (AS, Katsi, 2008, p.395)		

AS: author statement; PE: primary evidence

Statements in red are originating from qualitative studies with a CASP-score < 8

Appendix 13: Barriers and facilitators in the category "Implementer-related factors", including quotes from qualitative studies

Implementer-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
AWARENESS ABOUT COSTS AND BENEFITS				
Barriers			Competitors on the market WASH LOANS: Some COs indicated they were skeptical about the quality and perceived high cost of latrines supplied by the latrine businesses, relative to those supplied in the market. (AS, Emerging Markets Consulting, 2014, p.20)	
Facilitators			Sustainability of the loans WASH LOANS: "The loan is a catalyst to increase latrine purchases. We are working hard to make the program available in all seven provinces that Hands-Off sanitation marketing currently covers" (Phav Daroath, WaterSHED's WASH marketing manager). (PE, Emerging Markets Consulting, 2014, p.16) WASH LOANS: "Since loans for water filters are sustainable and even smaller than WASH loans, we think it is fine for us to scale up." (VisionFund management team during an expert interview). (PE, Emerging Markets Consulting, 2014, p.19) Awareness about costs "The average cost of a sanitation loan is higher than other loans, but it is our mission to work with the poor." (PE, Emerging Markets Consulting, 2014, p.31)	
MOTIVATION				
Barriers			Amount of commission received SANITATION FINANCING: Sanitation teachers in Kandal expressed their concern over the commission received on latrine sales provided by iDE. iDE's program manager confirmed that the organization was responsible for collecting commissions from the latrine businesses and paying them to sanitation teachers. iDE is currently trying to resolve the issue of late payments. Sanitation teachers are not full-time staff and earn an income	

Implementer-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
			from selling latrines on commission. They receive USD 3 per latrine, but this is not enough to cover their transportation and communication costs, given that they are responsible for several communes in a district.(AS, Emerging markets Consulting, 2014, p.28)	
Facilitators		Feeling of responsibility All community health educators took their responsibilities very seriously. Their leadership status was confirmed when they arrived late one morning for an educational session on the UDW campus via the project provided transportation. When questioned regarding their tardiness, they replied that they had stopped at a water standpipe where they observed that several women did not have clean jugs for water transport, and the area around the standpipe was dirty where community women had washed dirty diapers and disposed of other trash. The health educators explained that they had stressed to the women at the water standpipe the importance of using clean jugs and keeping the standpipe area clean to keep from getting sick from dirty water. (AS, Smith et al., 2004, p.66)		
PLANNING SKILLS				
Barriers	Time constraints Teachers are too busy, there is a lack of time to visit parents. This was mentioned in five schools, a surprisingly low number considering the burdens that teachers are under. (AS, Lansdown et al., 2002, p.429)	Time constraints "The pressure to spend and show coverage progress led officers to quickly arrange toilet construction and report positive results without verifying ground-level reality." (AS, Hueso and Bell, 2013, p.12)	Time constraints WASH LOANS: Many COs have complained about the workload and time constraint in promoting loans. COs in Battambang reported that WaterSHED staff are allowed to fill up loan applications.(AS, Emerging Markets Consulting, p.20) SANITATION FINANCING: Loan officers said they did not have enough time to attend sanitation meetings. Their schedules also tend to conflict with those of sanitation teachers. (AS, Emerging Markets Consulting, p.27) However, one loan officer said he did not have enough time to motivate people to take sanitation loans.(AS, Emerging Markets Consulting, p.28)	
	Other priorities The nurses were very open in stating that non-mandatory topics such as ours took a lower priority in their consultations, especially when demand was heavy. The same was true for planning health talks in the community where they were more likely to include the intervention topic as part of a session which involved obligatory topics than as a session in its own right. (AS, Yeager et al., 2002, p.769)		Bureaucratic loan application process SANITATION FINANCING: Sanitation teachers in Prey Veng said the application process on the part of loan officers was too slow because they did not have enough time to form a group of clients, this led to loss of interest in obtaining sanitation loans. As the consumer preference ranking in the FGDs indicated,	

Implementer-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
			loan processing speed is important to them. (AS, Emerging Markets Consulting, p.27)	
OTHERS SHOWING BEHAVIOUR				
Barriers	Lack of cooperation "Complaints came from three schools about the lack of cooperation or interest from parents." (AS, Lansdown et al., 2002, p.429)			
Facilitators	Multiplier effect Interviews showed that the SWS project was not confined to the school property—handwashing and hygiene were being discussed in the surrounding community—and the impetus for this translation is the children. (AS, Graves et al., 2013, p.167)	Behaviour as teachable moment The health promoters indicated that through home visits they frequently had the opportunity to find people doing the behaviors, which facilitated demonstrations and teachable moments for proper hygiene. (AS, Andrade, 2013, p.152)		
PUBLIC COMMITMENT				
Barriers			Lack of commitment "Lack of commitment on the part of loan officers, which slows down the loan process: this is common to all financing models…" (AS, Emerging Markets Consulting, 2014, p.30)	

AS: author statement; PE: primary evidence

Statements in red are originating from qualitative studies with a CASP-score < 8

Appendix 14: Barriers and facilitators in the category "Recipient-related factors", including quotes from qualitative studies

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
AWARENESS ABOUT COSTS AND BENEFITS				
Barriers		Awareness about costs Although the curriculum attempts to empower members to undertake self-supply, there was a widespread perception that lack of financial means and partnerships prohibited members from addressing sanitation. (AS, Brooks et al., 2015, p.389) I'm in the community talking about the subjects, and we all know about the consequences, but we don't have the financial means to do anything about them (Facilitator 0603-003). (PE, Brooks et al., 2015, p.389) The high frequency of the emptying of this latrine is due to the hardening of the sludge at the bottom of the pit. Because of these high costs, the CBO needs to close at times the latrines as it lacks the required finances. (AS, Schouten and Mathenge, 2010, p. 821)	Bureaucratic loan application process "Okay, your loan is now ready". So that means you can start construction of the toilet. But we haven't received the money yet. (PE, Cole et al., 2015, p.295)	Time constraints Handwashing-with-soap required time and effort: one had to go outside rather than quickly rinse hands in a bowl at home; it took longer to clean hands with soap; and it required greater amounts of water to rinse away all the suds, water which had to be fetched from a communal pump. (AS, Langford and Panter-Brick, 2013, p.136)
				Awareness about costs Cost and availability of soap were also a problem: while soap was present in every sample household, soap for hand-washing was still mentioned as a financial burden. (AS, Langford and Panter-Brick, 2013, p.136) If you spend ten rupees on soap, that's ten rupees you could have spent on food. (Interview data). (PE, Langford and Panter-Brick, 2013, p.136)

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
				Lack of importance attached They never think about hand-washing [before contact with food]. I remind them about it and they say 'Yes, yes' but you know they don't really think it's important. (CM meeting). (PE, Langford and Panter-Brick, 2013, p.138)
Facilitators	Improved health Findings from the focus group discussion demonstrated that communities appreciate the flexibility this offers and the benefit of time saving. It was noted that having a mobile in their hand means "you can reply whenever," (as stated by a focus group participant). Community members see the value in the content of messaging, with widespread acknowledgement that the campaign is "good and important to the community" especially with reference to immunisation and hand washing or other ways to prevent the spread of Polio. (AS, O'Donnell, 2015, p.8)	Awareness about benefits "Well-mobilized communities are receptive to things they benefit from. Once you create awareness, you increase ownership and then something can last." (PE, Kiwanuka et al., 2015, p.102) Improved health Some of them mentioned that hygiene practices were beneficial because they would prevent disease occurrence and hence save money in the long term. (AS, Akter and Ali, 2014, p.4) 'Though we have economic hardships, we buy soap for washing, resulting in improved health. We believe that this is less costly as compared to medicines. If we do not spend Tk. 20 for soap now, how will we be able to afford medicine at the cost of Tk. 500?' (PE, Akter and Ali, 2014, p.6) The primary advantages to having good hygiene that were identified by community member focus group participants were community cleanliness, a reduction in mosquitoes, and improved health. (AS, Andrade, 2013, p.147) "People don't get dengue anymore. And the stomach too because sometimes I would get something in the stomach…before diarrhea…before there was dengue continuously…now there's less." (PE, Andrade, 2013, p.148) User households particularly reported experiences of reductions in the incidence of diarrhea among children and intestinal parasites among adults. (AS, Bruck and Dinku, 2008, p.16) Qualitative evidence from evaluation team field visits provide a positive correlation between awareness of the health and other social benefits of improved facilities and a commitment to their proper upkeep, expressed through payment of fees for water services and routine maintenance of latrines by user	Availability of loans 'First movers' stated that the sanitation micro-loan removed the barrier of saving the upfront capital to purchase the Skyloo. (AS, Cole et al., 2015, p.297) Sometimes to keep money here is difficult because you can keep money for this, but something can come and you have to spend all the money ... So keeping money little by little is difficult, but paying little by little is easy (H5, male). (PE, Cole et al., 2015, p.297) SANITATION FINANCING: Both loan officers and sanitation teachers felt that their clients were aware of the benefits of having a latrine. Moreover, it was normal practice to take a loan for this purpose because clients could benefit from the latrine even while repaying the MFI.(AS, Emerging Marketing Consulting, 2014, p.26)	Improved cleanliness By contrast, using soap to clean hands made them feel 'nice', 'clean', 'fresh', 'light', 'at ease'. Only soap could offer such a 'really clean' feeling. The personal benefits of using soap focused on having soft, nice-smelling hands.(AS, Langford and Panter-Brick, 2013, p.136) [Soap] makes your hands smell nice and it makes me feel I look good, nice. I feel light afterwards. (Interview data) (PE, Langford and Panter-Brick, 2013, p.136)

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		households and institutions. (AS, Bruck and Dinku, 2008, p.23)		
	Use of new technologies Mobile phone education is more preferred then radio. Because you cannot listen to the radio every time beside the phone use every time you want. Because mobile is your hand, you can answer the program in the midnight for example." (PE, O'Donnell, 2015,p.9-10)	Improved cleanliness "…a lot has changed in hygiene, first of all. A lot has changed in the community's cleanliness." (PE, Andrade, 2013, p.147) "And there has been a change…in hygiene. There has been a change in the physical aspect of the area. A physical change, it's noticeable. There has been a change." (PE, Andrade, 2013, p.148) "I did what you told me, and now I have no more flies!" (PE, Smith et al., 2004, p.67)	Surplus resource generation 'First movers' reported that a further relative advantage offered by the sanitation micro-loan was tbe provision of surplus capital. (AS, Cole et al., 2015, p.297) I heard that apart from using the toilet also there will be manure. And to me that is a double win, so going to the toilet and manure (at the) same time. So we are not using money to buy fertilisers (H8, female). (PE, Cole et al., 2015, p.297)	
		Surplus resource generation CHC: It is common after the initial 20 health club sessions for club members to then enter into joint IGAs, such as nutrition gardens and bee keeping. This was mentioned to members before the clubs started and acted as an impetus to join. (AS, Whaley and Webster, 2011, p.28) 'The main interesting issue that motivated people to come to the health clubs was the fact that there was a point when it was said that there would be a time when income generating projects would be introduced' (PE, Whaley and Webster, 2011, p.28)		
		Loan system for health problems I have become enthusiastic for regular payment of my membership fee. I think VDC is the "Shelter Umbrella" for the poor. (PE, Sarker and Panday, 2007, p.24)		
MOTIVATION				
Barriers		Other priorities The poor and ultra-poor households were less interested in attending cluster meetings mainly due to the workload of the household and concerns about leaving children alone at home. Many did not practice hygiene because of busyness and negligence. This lack of awareness about hygiene and health-related issues is evident in some of their statements. (AS, Akter and Ali, 2014, p.6) Similarly, sanitation was seldom an expressed priority for village leaders and households, likely due to the taboo surrounding shit and the neglect of the voice of those most affected: women, children, and disabled. (AS, Hueso and Bell, 2013, p.11)	Prior loans SANITATION FINANCING: Sanitation teachers indicated the following constraints to persuading people to build a latrine or to take a sanitation loan to build one: • Substantial effort is needed to educate people about sanitation and to change their behavior and opinion about open defecation. • Some households are unable to buy latrines or to take a sanitation loan. • People tend to wait for free latrines and think they should not need to pay to defecate. • Some villages have potential clients who already have MFI loans, which could make them ineligible for further loans as the MFI has concerns regarding over-indebtedness. (AS, Emerging Markets Consulting, p.27)	Other priorities She's just not interested... It's very difficult for her. Her husband does nothing, he doesn't work, he just drinks all day and she has no-one to help her with all those children. She has other things to worry about. (CM meeting).(PE, Langford and Panter-Brick, 2013, p.139) For Sarmila, the potential threat of her child becoming sick as a result of not hand-washing was far less pressing than the need to earn enough money to survive the next week, especially as she was rarely at home to be able to instil this new hygiene behaviour. (AS, Langford and Panter-Brick, 2013, p.139)

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Habits I am always in a hurry and never cover my water vessel during transport. I have always collected water from the well and yet have never faced any diseases. I have brought up eight children this way. On the other hand, my daughter's family in Dhaka always uses boiled water but still suffers from diseases. (PE, Akter and Ali, 2014, p6) A few respondents did not give up old, unhealthy habits in spite of having the financial ability to implement new practices. Thirteen percent of unsuccessful, poor households were not interested in getting a loan for a latrine but wished to procure one free of cost. They expected BRAC to differ the rule of providing free latrines only to the ultra-poor. (AS, Akter and Ali, 2014, p.7) Feeling of undervaluation Ordinary villagers are also aware of the system, being in most cases in disagreement with district officers receiving an additional payment just by 'visiting the community'. Villagers feel further undervalued when freework is required from them as part of some sort of 'participatory process'. (AS, Jimenez et al., 2014, p.1111)		
Facilitators		Sense of ownership Similar isolated experiences in the other states also demonstrate that non-subsidy approaches do not hinder, but rather enable sanitary revolutions. Obviously, households need to be motivated to fund, design and construct their own latrines. In areas where this motivation happened, people exhibited better ownership, using and maintaining latrines effectively over time. (AS, Hueso and Bell, 2013, p.7) Woooooh…. people are used to free things but they do not value what they are given for free. (PE, Kiwanuka et al., 2015, p.101)		
PLANNING SKILLS				
Barriers		Time constraints "I am always in a hurry and never cover my water vessel during transport. I have always collected water from the well and yet have never faced any diseases." (PE, Akter and Ali, 2014, p.6) "Many did not practice hygiene because of busyness and negligence." (AS, Akter and Ali, 2014, p.6)		

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Political climate "Time pressures were made greater for a large number of families because of the political climate in Zimbabwe which had forced many people, especially male family members, to migrate to South Africa for employment. This affected a family's ability to build a structure such as a pit latrine, where manual work was required, and also meant female family members usually had more to attend to, and consequently had less time for the adoption of sanitation and hygiene measures." (AS, Whaley and Webster, 2011, p.33)		
Facilitators			Applying risk reduction strategies 'First movers' did however report using risk reduction strategies prior to accepting the innovation. One important risk reduction strategy, taken up by all 'first movers', was the identification of a plan to ensure the generation of income from the surplus capital provided from the sanitation micro-finance loan. This demonstrated a keen interest in reducing exposure to financial risk associated with purchasing the Skyloo. (AS, Cole et al., 2015, p.295) So our aim with that, if we can get that money we want to start keeping poultry. Poultry farming. So we can have enough money to pay back the (national financial institution) (H3, female). (PE, Cole et al., 2015, p.295) A second important risk reduction strategy (reported by 13 of the 14 'first movers') was the creation of small, informal groups of 'fust movers' prior to purchasing their Skyloo. (AS, Cole et al., 2015, p.295)	
AWARENESS OF PERSONAL RISK				
Barriers		Unawareness of the spread of the disease "The child's feces traditionally are thought not to be infectious. So they would [throw it away] near what we call chizaza-that kitchen outside-thinking that it is non-infectious." (PE, Lawrence et al., 2016, p.557)		Unawareness of the spread of the disease They never think about hand-washing [before contact with food]. I remind them about it and they say 'Yes, yes' but you know they don't really think it's important. (CM meeting). (PE, Langford and Panter-Brick, 2013, p.138) There was clearly no social expectation to use soap in the latter instances, unless hands were visibly soiled. You only need to wash with water before cooking. Your hands aren't dirty then so no soap is necessary. (Focus group data).(PE, Langford and Panter-Brick, 2013, p.136)

Facilitators	Awareness of the spread of the disease None of the 15 parents interviewed during intervention reported any negative feeling about the intervention. They all appreciated the HWWS intervention because it corresponded well with their knowledge of good child health. According to the parents, a child with clean hands will be healthy and will not suffer from diseases. (AS, Xuan et al., 2013, p.7) HWWS is needed because we are afraid of dirt, disease and contamination. HWWS is good, we all know . . .HWWS is very essential because it helps us to prevent disease and we are poor so we are afraid of disease; if we suffer from disease, we do not have money for treatment, HWWS also helps to protect us against environmental pollution. (PE, Xuan et al., 2013, p.7) When asked about the important messages of the video, the audiences were able to separate the dramatic story from the hygiene-related messages, specifying the importance of potty use and maintaining the home environment clean. (AS, Yeager et al., 2002, p.767)	Awareness of the spread of the disease They believed that the growth and spread of germs could be prevented by keeping the water pitcher in a dry and elevated area rather than a wet place. They were of the opinion that water alone was not sufficient to wash out germs completely but their spread could be prevented if soap was used for washing hands. (AS, Akter and Ali, 2014, p.4) 'Earlier, people were less conscious and less educated. Though they had money, they did not build latrines. But nowadays people procure latrines even on a loan,' said a non-poor, successful respondent. 'We cannot see germs, so soap should be used to remove doubt. No fear of germs remains in the mind after a hand wash with soap,' said another poor, successful respondent. (PE, Akter and Ali, 2014, p.4) 'Open defecation is not good for health and the environment. Human wastes may enter the pond and pollute water. People who drink dirty water may become sick or even die. (PE, Akter and Ali, 2014, p.6) "They like that we keep everything clean, mostly, uh, the water, that it doesn't have larva, also the latrines that they are covered, and that the paper is thrown away inside because they are pit latrines, right, and…so and also that we always keep the dishes covered, the food always hygienic so we don't get sick. Also the trash we have to bury it and not burn it because of the environment because it destroys the ozone and burning trash in El Salvador is a problem…" (PE, Andrade, 2013, p.138) "Because it's hygiene that they want to have in their home, knowing that by being hygienic, there's better health…because flies don't' come in, there's no insects, there's no cockroaches, there's no rats, so they thing that by being hygienic, you avoid insects and also illnesses." (PE, Andrade, 2013, p.141) "A person has to have everything hygienic…so they know, because everything passes to your stomach" (PE, Andrade, 2013, p.141) My members are very happy now because they are seeing chikungunya and dengue now and they know what these are. We didn't know about chikungunya, but we talked about dengue a lot in the club .... This fever is not a big challenge for my community now, because they knew how to prevent this kind of disease and what medicines they need to have ... and to go to the hospital for some treatment. And	Awareness of the financial risk But it came to a time there were some delays ... if we are going to wait for loans it may take time. But for those who are willing to start immediately can start provided they have got their own (building) materials ... a group of five people said "no we cannot handle this issue individually. Let us make a group". So we organised a group, namely a cooperative group so that whenever someone is lacking materials the other side can assist (H6, male). (PE, Cole et al. 2015, p.295)	Awareness of the spread of the disease [Hand-washing] kills the germs on your hands. If you don't do it, your child will become sick... I think [my son] is less sick now, he has less diarrhoea. (Mothers' group meeting).(PE, Langford and Panter-Brick, 2013, p.137)

		now they go to other's communities to mobilize other people and find a solution for the fever (Facilitator 0603-003). (PE, Brooks et al., 2015, p.386-387) In Himachal Pradesh, a socially progressive state, the story of sanitation is the most demand-driven one. Door-to-door campaigning and community theatre by sanitation committees of motivated GP members, Anganwadi workers or members of women's groups, proved to be powerful for awareness raising and yielded impressive results. (AS, Hueso and Bell, 2013, p.9) Participants ' knowledge of the relationship between improved hygiene and sanitation practices and health was generally high. (AS, Lawrence et al., 2016, p.555) "During the rainy season, when you defecate in the bush, the rains wash away the feces into the rivers and unprotected well. This brings about a lot of sicknesses, because they are our sources of drinking water." (PE, Lawrence et al., 2016, p.555) "I brought fresh feces and put Ihem right in front of everybody. Then I started explaining to the communily ... I didn't get them from the toilet, but from the bush .... Then I brought nice food-beef-and put it next to the feces. Then flies appeared and started feeding of feces, then on the food ... When people saw Ihis, they believed that defecating in the bush is not healthy, and they also saw for themselves that the flies that feed on feces in the bush are the same flies that feed on their food and leave it contaminated." (PE, Lawrence et al., 2016, p.556) "Before the CLTS program started, people didn't understand that they were eating feces .... They didn'l know that after defecating and cleaning oneself, they were smearing feces on their hands and when shaking hands, they were smearing those feces on other people's hands .... So when this program started, people opened their eyes. Their brains opened. They realized that for them to eradicale diseases in the communily, and they need to take care of feces. They realized that if they take care of feces, the money and time they spend going to health centers seeking medical attention will be used on other developmental issues. So people have really appreciated the CLTS program, it came like a bush fire." (PE, Lawrence et al., 2016, p.560) "CLTS-for now, I can say that it has tried [to mobilize communities to become ODF], but not completely because some are still defecating in the bush. while others have stopped, they now have their own latrines. They are concerned and now		

		realize that they should not defecate in the bush." (PE, Lawrence et al., 2016, p.560) "Things have changed and it is so impressive even to our traditional leaders. In the past, people didn't [have] toilets, they didn't know the benefits of latrines. But now they know the benefits of latrines:" (PE, Lawrence et al., 2016, p.560) "Change is there yes because before we used to wash our hands in the same basin even if there were ten of you and then you start eating. But today we take turns to pour water on each other while washing so yes, there is change." (PE, Lawrence et al., 2016, p.560) "People realized that they were contracting a lot of diseases by defecating in the bush because flies move from the feces in the bush to the food they eat. So people realized that most diseases are brought by flies and because of defecating in the bush, flies go to collect feces in the bush and bring it on food. Therefore, they believe that defecating in the bush is not a good thing." (PE, Lawrence et al., 2016, p.560) Generally, community members perceive the impact of CLTS on their communities as very high (Table 4). New behaviors, including latrine construction and usage (among others) were widely reported across all areas. Participants held a strong perception that diarrheal and other disease burden decreased greatly after CLTS triggering. There was no documenled evidence of a reduced disease burden, so these perceptions may stem from assumptions about the potential impact of CLTS. These results may actually suggest more about positive reception and acceptance of CLTS and the triggering process than an actual reduction in diarrheal diseases. (AS, Lawrence et al., 2016, p.559) Therefore implementation of MTUMBA approach increased people's awareness and understanding on the importance of constructing and using improved (quality) latrines to improve health condition. (AS, Malebo et al., 2012, p.39) It was further explained that, there is also a change in thinking as it was previously thought that child feces were harmless and that is why were not disposed off; at the moment majority of the households are disposing child feces in latrines. (AS, Malebo et al., 2012, p.41) Community animators and artisans helped to increase awareness hence many people demanded improved latrines. (AS, Malebo et al., 2012, p.42)		

		The study reported that people were well aware of the safe sources of water, including health and sanitation practices. They knew how to use the arsenic taste kit for tube-well water. The people were also aware of the need to change their food habits and dietary patterns. (AS, Sarker and Panday, 2007, p.27) Program leaders and community health educators reported increased awareness of the link between sanitation and health. (AS, Smith et al., 2004, p.67) CHC: An often-cited reason for improved sanitation and hygiene practices was to reduce the possibility of contracting and spreading disease. (AS, Whaley and Webster, 2011, p.27) 'The main reason [for building a latrine] is that open defecation causes diseases, we have got flies that will visit the areas where we have visited and they will come to our food' (PE, Whaley and Webster, 2011, p.27) 'when you come from farming you have to wash your hands, when you go to the toilet you have to wash your hands, wherever you come from you have to wash your hands' (PE, Whaley and Webster, 2011, p.32) CHC and CLTS: Extent to which a community has been exposed to disease, especially the recent outbreaks of cholera. (AS, Whaley and Webster, 2011, p.28) 'At that time there was nothing so much, but we were hearing that cholera had an outbreak there, and an outbreak there, so we expected at any time that cholera might be in our society' (PE, Whaley and Webster, 2011, p.28)		

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Feelings of shame and disgust "They were so touched and embarrassed as we took the walk of shame. They realized that they have been eating shit and drinking contaminated water. They realized the importance of having a toilet." (PE, Lawrence et al., 2016, p.556) "Numerous emotive factors including shame and disgust ...are influential in the process of behavior change. The transect walk seems to be particularly powerful in eliciting these emotive factors, driving much of the behavioral change." (AS, Lawrence et al., 2016, p.559) "they realized their states and they want to look modern or civilized as open defecation and other unhygienic behavior was discouraged during MTUMBA approach meeting by terming them backward and shameful as well as being the major sources of illnesses and some deaths." (AS, Malebo et al., 2012, p.41)		
KNOWLEDGE				
Barriers			Lack of financial knowledge WASH LOANS: ....potential clients' lack of understanding of financial products (terms and conditions).(AS, Emerging Markets Consulting, 2014, p.19-20) WASH LOANS: FGD interviews revealed that target clients have a very limited knowledge of financial products such as terms and conditions. They do not know which financial institution to choose but rather apply to any institution that deems them eligible for a loan, and whose loan terms are flexible. (AS, Emerging Markets Consulting, 2014, p.20)	
Facilitators		Knowledge of hygiene behaviour BRAC's frequent cluster meetings, home visits and other interventions such as posters, guidebooks, folk songs and street plays related to health and hygiene were instrumental in improving respondents' knowledge about hygiene-related behavior. (AS, Akter and Ali, 2014, p.4) "WASH brothers and sisters (ie BRAC staff) taught us during meetings and home visits that using soap for hand washing was safe. They told us to follow hygiene messages showing pictures from the guide		

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		book. All family members, including the children, are conscious now." (PE, Akter and Ali, 2014, p.4) Some respondents felt that a metal pitcher is of better quality and is more convenient than a clay pitcher. According to them, a metal pitcher could be kept anywhere on the floor, and it is not necessary to keep it in an elevated place. Some thought that if there is no visible dirt on hands, just water without soap is sufficient for hand washing. Respondents frequently used soap for washing hands after defecation, but not before food handling. There were varied perceptions regarding the use of water from various sources. Some preferred using soap when washing hands with pond water, but not when washing with tubewell water. (AS, Akter and Ali, 2014, p.7)		
NORMS				
Barriers		Lack of social control There was clearly no social expectation to use soap in the latter instances, unless hands were visibly soiled. You only need to wash with water before cooking. Your hands aren't dirty then so no soap is necessary. (Focus group data). (PE, Langford and Panter-Brick, 2013, p.136)		
Facilitators		Social control CMs identified one of the most successful elements of the intervention to be harnessing social norms regarding the need 'to be seen to be clean.' Being aware that other people might be watching what they were doing was a powerful driver to behaviour change. (AS, Langford and Panter-Brick, 2013, p.137) [The mothers] have to use the public toilets down by the stream and that's right next to the rower pump where women wash their clothes. They come out and they know people are watching so they make sure to come over and ask for some soap so they can wash their hands. (CM meeting). (PE, Langford and Panter-Brick, 2013, p.138) Everyone knows each others' business here. They all want to keep up with each other. So if so-and-so's doing it, they want to do it too. (CM meeting) (PE, Langford and Panter-Brick, 2013, p.138)		Social control mothers often described how their children learned to use the handwashing station, suggesting that handwashing was part of a parent's nurturing role. In addition, participants in both urban and rural sites alluded to descriptive norms for handwashing. Though many lacked established handwashing routines, several participants stated, "Everybody should wash their hands regularly," indicating that some level of hygiene was expected. (AS, Hulland et al., 2013, p.8)
OTHERS SHOWING BEHAVIOUR				

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
Barriers		Competition inducing disappointment Whether 'model home competitions' increase or decrease enthusiasm for health practices. (AS, Whaley and Webster, 2011, p.28) People often agreed with the idea of a model home competition in theory, as it provided the opportunity for club members to compare themselves with and learn from the 'best households' in their community. In reality though, many felt hard done by when they didn't do well or win a prize, causing some to 'drag their feet on the issue of club work'. (PE, Whaley and Webster, 2011, p.33)		
Facilitators		Other community members behaviour Other poor households that did not benefit financially were inspired about hygiene by observing the practices of their neighbors. (AS, Akter and Ali, 2014, p.5) 'We were motivated to install latrines looking at other neighbours' practice of safe latrines. Thus, we procured slab latrines from BRAC on credit and installed them. This especially reduced our women's problems of having to defecate in the open or in jungles.' (PE, Akter and Ali, 2014, p.5) "Well, for example, if I go to a home and they have the latrine topped, I say, "it's great that you always keep it topped because they do it in other homes, maybe the neighbor) and they always keep it that way."" (PE, Andrade, 2013, p.153) "For those that didn't have latrines, they felt they should build because others had already, so they felt pressured. They also learned how they should keep the latrines clean. They saw the need." (PE, Lawrence et al., 2016, p.556) Household member's behaviour Community members also learned improved hygiene behaviors through secondary sources, such as through observing members of their households, especially the ama de casa, who served as a secondary change agent. (AS, Andrade, 2013, p.153) "I think that it's a custom that people from a young age are taught to live hygienically. She goes and	Other community member's behaviour All 'first movers' reported observing a Skyloo prior to purchase. As discussed above, the majority of 'first movers' observed a Skyloo at the home of tbe first Skyloo customer (H7, male). The first customer reported visiting another NGO project that had recently constructed urine-diverting dehydration toilets that had similar design principles as the Skyloo. This fin ding demonstrates that observing the Skyloo was an important contributing factor far 'first movers' in adopting the innovation. (AS, Cole et al., 2015, p.298)	

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		goes and goes, but if since I was young my mom didn't teach me to sweep, I'm not going to do it. Because hygiene comes from when you are young. Uhuh, but if I'm not accustomed to it, I'm not going to do it." (PE, Andrade, 2013, p.153)		
		Competition inducing enthusiasm "The competition among villages is there because each and every village wants to be the first to become ODF." (PE, Lawrence et al., 2016, p.556) "... so competiton is there because, for instance, the community I come from, they are saying they want to build latrines made of bricks. In some communities, they are building thatched ones, so competition is there." (PE, Lawrence et al., 2016, p.556) "Yes there is [competition among villages]. When they see others celebrating, they also step up and build toilets so that they can also benefit from the program." (PE, Lawrence et al., 2016, p.556) "Yes there is [competition among villages]. When they see others celebrating, they also step up and build toilets so that they can also benefit from the program." (PE, Lawrence et al., 2016, p.556) CHC: The CHC approach appears to generate a natural sense of competition between members. (AS, Whaley and Webster, 2011, p.28) 'you get this sort of peer reinforcement, which spirals up so that cat sanitation becomes the minimum, but actually when they compete with each other they try to do better and better and better' (PE, Whaley and Webster, 2011, p.28)		
PUBLIC COMMITMENT				
Facilitators		Identity formation Club members agreed a unifying club name and visionary club slogan, stimulating new identity formation and facilitating social bonding. Some of the club names included KSK Pou Lavi (CHC For Life), KSK Men yo Ansanm (CHC Hands Together), and KSK Lakou Leon (Leon Yard). The adoption of the term lakou in two club names is noteworthy. A lakou is a traditional, rural organizational structure of extended family members living together around a central courtyard and is an overt symbol of the extended family group. This theme of the club being family was mentioned by four facilitators. Members		Pledge taking Respondents who had taken the pledge felt that it brought greater commitment to behaviour change. (AS, Rajaraman et al., 2014, p.4) "[The pledge] is 100% required, as we tend to forget. If I tell you that I will come somewhere, then even if there is rain or wind, I will still come. To keep up our word, we take a pledge…Some of them did not take the pledge [with the motion of] stretching out their hands, but even if their inner consciousness was aligned, it is enough". (PE, Rajaraman et al., 2014, p.4)

Recipient-Related Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		rallied around this new identity and new social bands were developed. This bonding was of ten inclusive of various age and education levels and even occurred in communities with civil strife. The club slogans served both as a reminder of the members social commitment and a call to action. 'One community is a chain of solidarity to manage health', 'My health is your health', and IEach one helps the other', are slogans that demonstrated a sense of solidarity and cemented the new social identity. (AS, Brooks et al., 2015, page 385-386) Finally, the club identity reinforeed the concept that members must hold each other accountable. With the emergence of confident leaders, equipped with knowledge and motivated to action, the club created an environment through which change could be achieved. (AS, Brooks et al., 2015, p.386)		
SELF-EFFICACY				
Barriers		Low initial self-efficacy "Well, yeah, but they achieve it slowly. In the beginning, people think it's difficult. Because "being poor" they say "I can't do a certain thing."" (PE, Andrade, 2013, p.155)		
Facilitators		Simplicity of the new behaviour Study participants indicated that the improved hygiene behaviors were typically very easy to perform. There was consensus among focus group respondents about the simplicity if the behaviors. (AS, Andrade, 2013, p.151) "They are not difficult." (PE, Andrade, 2013, p.151) Self-efficacy In addition, self-efficacy (individual level) for toilet construction and usage was high, with most participants suggesting that toilets could be built easily either by households alone or with assistance from community members with an interest in achieving ODF status. (AS, Lawrence et al., 2016, p.560)		

AS: author statement; PE: primary evidence

Statements in red are originating from qualitative studies with a CASP-score < 8

Appendix 15: Barriers and facilitators in the category "Implementer-related contextual factors", including quotes from qualitative studies

Implementer-Related Contextual Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
PERSONAL: DEMOGRAPHIC VARIABLES				
Barriers		Implementer not part of the community "Because they're not from the community, they wouldn't be interested in whether the community was clean or not." (PE, Andrade, 2013, p.118) "They don't know the people, they would be received with mistrust too, right" (PE, Andrade, 2013, p.118) "…and people have to identify themselves well…and a person can be a little scared that something could happen, right?" (PE, Andrade, 2013, p.118) "…people would be embarrassed to share their hygiene or other problems with someone from outside of the community…" (AS, Andrade, 2013, p.118) "They would feel…mmm…more embarrassed…" (PE, Andrade, 2013, p.119) "…they felt uncomfortable with us." (PE, Andrade, 2013, p.119) "The use of an organization's own paid staff… had limitations in developing good communication and rapport between hygiene educators and community groups…" (AS, Bruck and Dinku, 2008, p.25)		
		Gender "Female focus group participants said that they would approach a female promoter for particular needs, whereas they would not approach a male promoter…" (AS, Andrade, 2013, p.132) "... to ask for condoms, we won't ask Emilio, instead we'll ask Blanca." (PE, Andrade, 2013, p.132) "…but there are some (women) that no. They are more discreet." (PE, Andrade, 2013, p.133) "…you can't deal with a man because it's embarrassing…" (PE, Andrade, 2013, p.133)		

Implementer-Related Contextual Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		"… for the promotion of hygiene in the home, community members saw no difference between messages coming from a male or a female…"(AS, Andrade, 2013, p.133)		
Facilitators		Implementer part of the community "The health promoters indicated that community members viewed them as three of their own, primarily meaning from the same community." (AS, Andrade, 2013, p.117) "…we're the same and we feel equal to them." (PE, Andrade, 2013, p.117) "If the health promoter is from the same community, they are more available in cases of emergency." (AS, Andrade, 2013, p.122) "…they are so close, so they'll rush over" (PE, Andrade, 2013, p.122)		
SOCIO-CULTURAL: DIGNITY AND RESPECT				
Barriers			Lack of kindness and respect "…his manner and language towards villagers was not appropriate" (AS, Emerging Markets Consulting, 2014, p.27)	
Facilitators		Kindness and respect "The acceptance and trust of a health promoter is closely tied to the degree of amabilidad that they demonstrate in their persona." (AS, Andrade, 2013, p.112) "Because they have good conduct. They treat people well." (PE, Andrade, 2013, p.113) "It has changed….and for their kindness, too. They do it with such kindness." (PE, Andrade, 2013, p.113) "… that they can win people over being kind and all." (PE, Andrade, 2013, p.113) "…it's creating a friendly environment so that people trust us and we can express the goals of our visit…" (PE, Andrade, 2013, p.114)		

Implementer-Related Contextual Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		"Another key concept, respeto (respect), that is very closely tied to amabilidad emerged as an important theme …" (AS, Andrade, 2013, p.114) "When they go out to visit people, they are very kind, uh, they greet people with respect, ..." (PE, Andrade, 2013, p.114) "…and I have always instilled in them that to the people, no matter how humble we see them, they have to be respected." (PE, Andrade, 2013, p.115)		
		Trust "Community members, health promoters and school directors all indicated that trust was an important factor in the relationship between the health promoters and households." (AS, Andrade, 2013, p.129) "… but they trust us enough to say that they haven't done it maybe." (PE, Andrade, 2013, p.130)		
SOCIO-CULTURAL: INFORMATION ENVIRONMENT				
Barriers			Clarity and completeness of the information "But still there was some question marks (H12, female)." (PE, Cole et al., 2015, p.298)	Sponsorship transparency "…although they had been informed that it was an NGO working in partnership with a local hospital, a few people speculated that a soap company could be sponsoring the intervention or a politician might be using it as a vehicle for future electioneering." (AS, Rajaraman et al., 2014, p.4)
Facilitators		Continued availability and accessibility of the implementer "In addition to their continual presence in the community, many community members viewed the health promoters as a major source of instrumental support and as a resource for information, help and referrals." (AS, Andrade, 2013, p.123) "… be dedicated to the hygiene and well-being of the community." (AS, Andrade, 2013, p.133) "They have the role of guiding and educating people of the community." (PE, Andrade, 2013, p.134)	Continued availability and accessibility of the implementer "All 'first movers' reported a change agent was another vital source of regular and sustained information about purchasing the Skyloo." (AS, Cole et al., 2015, p.296)	
SOCIO-CULTURAL: LAW-LEGISLATION				
Barriers		National NGO legislation		

Implementer-Related Contextual Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		"The new legislation on charities and associations is expected to redefine the operational context and landscape for NGOs…" (AS, Bruck and Dinku, 2008, p.29)		
		Laxity in law implementation and enforcement "Districts should be transferring 20% of their own revenue to the villages for development activities, but this is rarely implemented, and not monitored or enforced from national level." (AS, Jimenez et al., 2014, p.1111) "The Bylaws were mentioned to only influence very few of the households due to laxity in their implementation and lack of regular inspection in the households." (AS, Malebo et al., 2012, p.41)		
		Corruption "… in one CBO, the toilet committee has been changed three times in 2 years due to alleged misappropriation of the revenues." (AS, Schouten and Mathenge, 2010, p.821)		
Facilitators		Informal local legislation "The establishment of community by-laws that linked water and sanitation was another driving force for sustainability" (PE, Kiwanuka et al., 2015, p.102)		
SOCIO-CULTURAL: SOCIOECONOMIC STATUS-ROLE MODEL-AUTHORITY				
Barriers		Implementer's authority/status "… they were considered by the resident to be beneath the resident in social standing." (AS, Andrade, 2013, p.128) "The problem is that he is a teacher and he thinks he's better than me." (PE, Andrade, 2013, p.128)		Implementer's authority/status "…the volunteer in another village was a young woman who lacked confidence and believed that she was not welcomed by many of the village households because she belonged to a lower caste." (AS, Rajaraman et al., 2014, p.4)
Facilitators		Implementer's authority/status "They reported being considered with more respect, carrying an increased authority and importance, and being seen as community leaders." (AS, Andrade, 2013, p.116) "Now that we have the position of being health		Implementer's authority/status "In one village, a lawyer who was a prominent personality went door-to door to promote HWWS." (AS, Rajaraman et al., 2014, p.4)

Implementer-Related Contextual Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		promotors, and helping them, they put a lot of importance on us…" (PE, Andrade, 2013, p.116) "… the health promoters, a commonly-accepted community authority." (AS, Andrade, 2013, p.150) "Because obedience is important." (PE, Andrade, 2013, p.150) "They are doing their job and you have to obey…" (PE, Andrade, 2013, p.150) "Yes, but you do it because they've told me…" (PE, Andrade, 2013, p.150) "The power of traditional leaders is well respected in this ward and this also points to the success of community projects…" (AS, Katsi, 2008, p.396) "… validated educators (by nametag) … had come to symbolize the community health educator as a leader." (AS, Smith et al., 2004, p.67)		
SOCIO-CULTURAL: SOCIAL CAPITAL				
Facilitators		Developing a culture of sharing resources and cooperation "The practice of sharing of VDC resources among the members enhanced the integration and solidarity in the village." (AS, Sarker and Panday, 2007, p.25) "It was reported that as the sharing responsibility and the "we feeling" among the members of VDCs became stronger, the sense of ownership and belongingness were enhanced." (AS, Sarker and Panday, 2007, p.25) "… the culture of cooperation and sharing of responsibility are strengthened among them." (AS, Sarker and Panday, 2007, p25) "The club slogans… demonstrated a sense of solidarity and cemented the new social identity." (AS, Brooks et al., 2015, p.385-386) "Finally, the club identity reinforeed the concept that members must hold each other accountable." (AS, Brooks et al., 2015, p.386)		
SOCIO-CULTURAL: SOCIAL-POLITICAL ENVIRONMENT				

Implementer-Related Contextual Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
Barriers		Political interruption of the intervention "… politicians frequently disrupted established community efforts …" (AS, Kiwanuka et al., 2015, p.103) "Politicians are the ones encouraging dependence among the people …" (AS, Kiwanuka et al., 2015, p.103) "In trying to influence voters they pushed for boreholes to be installed in their constituencies instead of honouring the established criteria…" (AS, Kiwanuka et al., 2015, p.103) "During campaign season some politicians come in and want to influence priorities for boreholes …" (AS, Kiwanuka et al., 2015, p.103-104)		
PHYSICAL: AVAILABLE SPACE				
Barriers		Accessibility of the facilities "Accessibility of the facility was poor during wet seasons… the paths to the facilities were very narrow… water storage tanks … were to be rolled over the peoples' roofs causing a lot of annoyance" (AS, Schouten and Mathenge, 2010, p.821)		
PHYSICAL: NATURAL AND BUILT ENVIRONMENT				
Barriers		Members of Community Health Clubs not representative for community "The larger the geographic space that members represent, the greater the variety of living 'realities' that a club's members face, making consensus around one solution more difficult to achieve." (AS, Brooks et al., 2015, p.392) Lack of financial resources "The high frequency of the emptying of this latrine is due to the hardening of the sludge at the bottom of the pit. Because of these high costs, the CBO needs to close at times the latrines as it lacks the required finances." (AS, Schouten and Mathenge, 2010, p.821)		

Implementer-Related Contextual Factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
PHYSICAL: PLACE OF RESIDENCE (RURAL VS URBAN)				
Barriers		Transportation difficulties "…key personnel …lacked access to a vehicle or bicycle. This made it difficult to cover large distances between rural villages." (AS, Lawrence et al., 2016, p.558) "Stakeholders from the lowlands and from provincial and district offices mentioned the low per diems combined with long distances and poor road conditions to highland villages as the major de-motivating factors for their staff to perform outreach activities." (AS, Rheinlander et al., 2012, p.608)		
PHYSICAL: REMOTE AREAS				
Barriers		Hard to reach areas "…the diversity and density of stakeholders varied considerably between the lowland and highland settings, with a much stronger platform for RHSP in the lowlands.(AS, Rheinländer et al., p.603) One Youth Union group was doing occasional activities at one secondary school in the highlands …, while being active in more activities in the lowlands..." (AS, Rheinländer et al., p.603)		

AS: author statement; PE: primary evidence

Statements in red are originating from qualitative studies with a CASP-score < 8

Appendix 16: Barriers and facilitators in the category "Recipient-related contextual factors", including quotes from qualitative studies

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
PERSONAL: DEMOGRAPHICS				
Barriers	Age (younger) Observations also indicated some differences between young and older schoolchildren; while 1st graders were able to practice HWWS on their own at home, they did not convey any of the verbal information from teachers and lectures to their families. (AS, Xuan et al., 2014, p.7)	Gender (male) "Yes, because the men go to the fields to cut corn, and one stays at home." (PE, Andrade, 2013, p.136) "The men are busy working." (PE, Andrade, 2013, p.137) During the frst days of training, there was resistance from male-headed households. The husbands felt threatened… (AS, Katsi, 2008, p.395) …we believe that most men have short skills and experience to solve water challenges still faced by us women, despite initiating the programmes in last decade." (PE, Silali and Njambi, 2014, p.14) Gender (female) Observations indicated that women do not have the same decision-making power as men, even if they hold the same leadership positions as men… Men were the only ones who spoke during the WASCOM meeting (AS, Adeyeye, 2011, p.24) In a patriarchal setup where male members dominate the decision making process, programmes which are expected to mainly benefit the women may be overlooked and take a backseat. (AS, Pardeshi, 2009,p.83) As previously described, a gender divide clearly existed in RHSP, with the strongest focus on women for domestic and personal hygiene and on men for technical aspects of environmental sanitation and water supply. All stakeholders also agreed that women rarely attended village meetings and that husbands would rarely inform wives about the information given there. (AS, Rheinländer et al., 2012, p.609)		Religion "Members of the Muslim community in particular were concerned that taking a public pledge might contravene their religious beliefs." (AS, Rajaraman et al., 2014, p.4) ..Age If the handwashing station was too difficult to use, caretakers became responsible for helping the old and young to wash hands. (AS, Hulland et al., 2013, p.7) Age was an important factor in use of the handwashing station because age often indicated who was in the home and how easy a handwashing station was to use. (AS, Hulland et al., 2013, p.8) The HWWS school report cards proved unsuitable for the youngest students who were not able to follow the instructions. (AS, Rajaraman et al., 2014, p.5)

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Education High illiteracy levels of people in communities prevented them from understanding the importance of hygiene and sanitation making it hard to change behavior. (AS, Malebo et al., 2012, p.52)		Occupation Occupation: As a result of her work, Bhumika often did not attend the mothers' group meetings, and was rarely at home when the CM went to visit. (AS, Langford and Panter-Brick, 2013, p.139)
Facilitators		Gender (female) CLTS facilitators take the gendered division of labor into account when structuring their CLTS interventions. (AS, Adeyeye, 2011, p.23) "First of all, you invite the women…If you are able to change the attitude or culture of the women, they will influence their husbands" (PE, Adeyeye, 2011, p.23) Households interviewed in Osogbotedo also noted the importance of women in water and hygiene-related labor. (PE, Adeyeye, 2011, p.24) …it was of key importance that the household role of the ama de casa was engaged (AS, Andrade, 2013, p.136) "The person dedicated to cleanliness is the ama de casa…" (PE, Andrade, 2013, p.137) "They just tell them what they have to do in the home and they do it because it's work…like housework. They have to do it." (PE, Andrade, 2013, p.137) Although women were the stable factor in each household, this community identified women's dominance over the youth as a potential source of promoting change. (AS, Smith et al., 2004, p.66) People want to train someone who will not run away with the skills (KI Pallisa) Women are committed. (PE, Kiwanuka et al., 2015, p.101) Women were identified as major beneficiaries of the campaign by the women themselves as well as the men and TSC cell members. (AS, Pardeshi, 2009, p.81) The community and administration acknowledged and appreciated the vital role of women in achieving the goals of TSC. Women were considered to be important target groups in IEC and training activities. (AS, Pardeshi 2009, p.82)		Gender (female) Women came in more frequent contact with soap and water for household chores than their male counterparts, were more likely to be in charge of teaching children… (AS, Hulland et al., 2013, p.9)

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Some of the gender sensitive slogans contributed by women included: "How can the husband consider himself to be the head of the household when he sends the women of his house to the open fields for defaecation?" (PE, Pardeshi, 2009, p.83) During this intensive phase of the campaign the women played a key role in sweeping the roads and courtyards, digging pits for latrine etc. (AS, Pardeshi, 2009, p.83) The women members of VDCs were found to be very enthusiastic involved in different programs of village development, including health and sanitation. (AS, Sarker and Panday, 2007, p.26) Women were now recognized by some of the men as community leaders in sanitation and health care education. This was demonstrated by men attending some of the educational sessions led by women community health educators. (AS, Smith et al., 2004, p.67)		
		Female privacy improvement In schools, the provision of VIPs has significantly contributed to environmental cleanliness. School girls have particularly enjoyed privacy in using the latrines… (AS, Bruck and Dinku, 2008, p.16)		
		Age (youth) Child-centered actlivities, including song and dance, were frequently mentioned as important components of CLTS triggering, stimulating youth involvement and, eventually, behavior change. (AS, Lawrence et al., 2016, p.557) "With children, you teach them through song, playing with them and things that make them happy .... In that way, they learn to be attentive." (PE, Lawrence et al., 2016, p.557) "When you tell children something, they normally get it as Gospel Truth and stick to it… They normally even encourage their parents to do the right thing if they see that their parents are not doing the right thing." (PE, Lawrence et al., 2016, p.558) "[Children] even come up with songs and poems. They come and sing for the audience of the elderly.		

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		In one of the songs, they say we are tired of eating feces, we don 't want to eat feces, please build toilets! You know such simple slogans. The elderly also get sensitized." (PE, Lawrence et al., 2016, p.558) Children also contribute to sanitation efforts in communities. We found that children can influence both their peers and family members in enforcing the messages of sanitation behavior change. (AS, Lawrence et al., 2016, p.559)		
PHYSICAL: AVAILABLE SPACE				
Barriers		Densely populated areas 'They are living like sardines, and if you would like to build a community latrine for them, you cannot find any place.' (PE, Brooks et al., 2015, p.389) A critical issue for the NGOs in the densely populated slum area is to find an appropriate location for the communal sanitation facility. (AS, Schouten and Mathenge, 2010, p.821)		Small living quarters In the urban site, living quarters were small and densely arranged. Finding a convenient location to install a large handwashing station was difficult because living space was at a premium. (AS, Hulland et al., 2013, p.9) "Our mobility inside the room was interrupted due to the installation of the handwashing station because it is congested inside the room." (PE, Hulland et al., 2013, p.9)
Facilitators			Space-saving benefits A further relative advantage of constructing a Skyloo, as reported by 'first movers', was the space-saving benefits. (AS, Cole et al., 2015, p.297)	
PHYSICAL: LOW VS MIDDLE-INCOME COUNTRIES				
Facilitators			High-income villages SANITATION FINANCING: High-income villages, for instance, are less likely to take sanitation loans since they can afford to build latrines. (AS, Emerging Markets Consulting, 2014, p.28)	
PHYSICAL: NATURAL AND BUILT ENVIRONMENT				
Barriers		Lack of maintenance of the infrastructure …the kebeles's good intention of having such facilities did not, however, take into account a system to ensure their routine upkeep and maintaining the latrines clean for sustainable use. (AS, Bruck and Dinku, 2008, p.14) "Especially we Tongas. [we] would want to have a [separate] latrine, but not to build as many as they	Complexity Over half the 'first movers' (8 of 14) expressed concern about the complexity of the urine-diverting component of the Skyloo and the overall maintenance required. The complexity was related to the control of smell, the removal of waste from the storage vaults and carrying out repairs. (AS, Cole et al., 2015, p.298)	Lack of visibility "When I am busy with other work, I would not regularly go to the tubewell [located outside of the house] to clean my hands before food preparation because it is placed far away from where I cook. But now I wash regularly with the kitchen handwashing station before cooking." (PE, Hulland et al., 2013, p.7)

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		can .. . so you end up overloading the latrine." (PE, Lawrence et al., 2016, p.558) Lack of quality of the infrastructure "Mining activities at Masieda discourage and bring back the project to 2007 situation. You have three thousand people who do not use toilets. They mine in the same source of water for people and animals –consumption, the only source". (PE, Malebo et al., 2012, p.55) The project built only one new block for girls and left the boys to use an old latrine which was in disrepair. The boys' latrine has no responsible caretaker, no hand washing facility, and old human excreta were observed scattered in and around the latrine rooms. (AS, Bruck and Dinku, 2008, p.14) Temporary structures deteriorate over time, and rebuilding them proved an unpopular option with respondents. (AS, Whaley and Webster, 2011, p.31) 'if you have a toilet that is open, where there's a hole and the flies can go in and out, then that's also open defecation because you're not breaking the faecal oral route' (PE, Whaley and Webster, 2011, p.31) A common issue raised by interviewees was that children tended to tamper with the temporary structures, emptying or even breaking them. Nonetheless, the results point to a problem with the sustainability of temporary HWFs and, considering the relative ease with which they are constructed, a problem with the desire to maintain them. (AS, Whaley and Webster, 2011, p.32) The issue of affordability also poses a challenge to the sustainability of a project, as in time temporary structures tend to break or fill up and there was seen to be a general unwillingness amongst beneficiaries to replace these structures. Instead, people sought to construct more costly permanent structures, reinforcing the need for available capital if a community is to move up the sanitation ladder. (AS, Whaley and Webster, 2011, p.35) 'If you say dig the holes they will dig the holes, they will mould the bricks, they will build their own toilets. But the challenge is cement. So I think you can support them with cement so that we reach the ZOD that we want. There is no way we can achieve 100%		Lack of access to handwashing station "In a slum, our hands become dirty the whole day. Moreover, electricity is absent, so water is not available… Water from the bodna is finished after one person washes his or her hands." (PE, Hulland et al., 2013, p.9) In the urban field site, several participants mentioned concerns regarding shared access to a handwashing station placed next to a shared latrine and the implications this had on maintenance among sharing households. (AS, Hulland et al., 2013, p.8) Small capacity Handwashing technologies with smaller capacity such as the bottle with valve, bodna, or soapy water bottle when used by a large number of people, required frequent refilling and were not conducive to repeated use throughout the day. (AS, Hulland et al., 2013, p.8) One participant said, "The size of the bottle [with pump] is small so we need to refill it frequently, but sometimes we forget." (PE, Hulland et al., 2013, p.8)

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		ZOD if we don't have permanent structures.' (PE, Whaley and Webster, 2011, p.33) The high frequency of the emptying of this latrine is due to the hardening of the sludge at the bottom of the pit. Because of these high costs, the CBO needs to close at times the latrines as it lacks the required finances. (AS, Schouten and Mathenge, 2010, p.821)		
		Insufficient access to necessary materials For some, additional factors preventing latrine construction included insufficient access to necessary materials (such as "strong logs") for building permanent toilet structures and poor soil conditions (either rocky soil that inhibits pit digging or sandy soil that predisposes latrines to collapse). (AS, Lawrence et al., 2016, p.557) "The only barrier is that the logs that we use, the very strong logs, are finished. We are remaining with the small ones such that, when we use them, they are eaten by termites.' (PE, Lawrence et al., 2016, p.558)		Renter change "In the last few days, when water and soap have run out, I have managed to refill it. But our compound environment is not good. After some time the renters change, so who will take responsibility? Taking care of the soap and water is not possible for everybody. There is no good place to install the drum… [and it] can be broken. Then, quarrels arise. So, single ownership is better." (PE, Hulland et al., 2013, p.8)
		Type of soil "The barriers [to construction] are some areas have sandy soil. So you can dig a pit and put the logs and build a very good latrine, but when the rains come, rain water flows in the latrine then it collapses." (PE, Lawrence et al., 2016, p.558) "[Challenges with latrine construction include] variation in the type of soil in the villages, for instance a toilet which is located in a sandy area will not last long enough because they easily collapse." (PE, Lawrence et al., 2016, p.558) Types of soil structure in some of the areas were identified to slow down construction of latrines by making pit digging a challenging task. (AS, Malebo et al., 2012, p.54) CHC and CLTS: The amount of cover the area provides; whether ground suitable for digging a pit; available resources; likelihood of outsiders passing through. (AS, Whaley and Webster, 2011, p.28)		Dirtiness We have to live next to this dirty, smelly stream and there's nothing we can do. You can't keep yourself or your children clean and healthy if you have to live in a place like this. (Interview data.) (PE, Langford and Panter-Brick, 2013, p.139)
		No access to clean water		

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Scarcity of water was mentioned by most respondents to be affecting construction of slabs, latrine structures and for other sanitation purposes as people have to fetch water a far distance from their houses and working places. (AS, Malebo et al., 2012, p.54) 'I had some difficulty in carrying water from others' tubewells. However, I didn't mind because carrying water was better than suffering from diseases due to unhygienic practices.' (PE, Akter and Ali, 2014, p.6) Difficulty in carrying water was perceived by many as the cause of lack of willingness in consistently practicing hygiene behavior, such as hand washing at critical times and sanitation-related practices. Consequently, the respondents were unable to use enough water for latrine cleaning, and hand washing. (AS, Akter and Ali, 2014, p.7) Carrying tubewell water from a distant place was backbreaking. So, we used pond water for washing hands. (PE, Akter and Ali, 2014, p.7)		
Facilitators		Cleanliness In addition, several reported that the smell or perceived "dirtiness" of latrines was feared by children, and noted that it was important to keep latrines clean. (AS, Lawrence et al., 2016, p.557) "One [problem] that I heard of at school they expressed the smell. If the pit latrine smells, they told that they wouldn't prefer to go there because they feel when they come out of a smelly pit latrine, they will smell". (PE, Lawrence et al., 2016, p.557)	Quality of the infrastructure the Skyloo was a durable solution and would save households from paying for labour and materials to construct a new below-ground pit latrine each year. (AS, Cole et al., 2015, p.297)	Visibility "The drum is a reminder to wash hands because it is installed near the toilet". And another said, "This station (bottle with valve cap) acts as reminder for us to wash our hands because it is always in front of us." (PE, Hulland et al., 2013, p.7)
				Access to water Access to water had a critical impact on functionality of the handwashing station, especially in designs with small water storage capacity. (AS, Hulland et al., 2013, p.9)
		Open space 'The main reason [for having a latrine] is because this area is a very open space so people have to find a way to hide from being seen' (PE, Whaley and Webster, 2011, p.32) 'Back home we had toilets because we didn't want to be seen, but here there are a lot of bushes'. (PE, Whaley and Webster, 2011, p.34)	Climate And the main reason to me - these toilets we don't dig. It is just (on the) surface. !t's permanent so people were very happy without digging because when the rain comes the Skyloo won't fill up with water. And the foundation is really decent. Decent, like concrete. So you can die and you will still leave it (H7, male). (PE, Cole et al., 2015, p.297)	Availability of replacement parts "If it is stolen, we won't be able to replace it because the pumper is not available." (PE, Hulland et al., 2013, p.9) Participants in the urban site often assessed the handwashing station design they had received in terms of availability of replacement parts at the market. (AS, Hulland et al., 2013, p.9)
PHYSICAL: PLACE OF RESIDENCE				
Barriers	Highland areas …schoolchildren in the highland clearly received less parental guidance on many aspects of care and	Area of conflict		

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
	health including personal hygiene and HWWS compared with children from the lowland areas (AS, Xuan et al., 2014, p.8)	In communities with substantial civil conflict, facilitators reported that the members did not feel safe enough to meet, let alone clean-up or involve non-members. (AS, Brooks et al., 2015, p.390)		
Facilitators			City centers SANITATION FINANCING: Those near city centers or commune centers also tend to have higher incomes, according to a loan officer in Kandal.(AS, Emerging Markets Consulting, 2014, p.28)	
PHYSICAL: REMOTE AREAS				
Barriers	Remote areas Water availability—it is not there. We have a river, but it is quite away, some distance away. So getting it is not so much easy. Because we are also afraid if you sent the children there, they may get in the river and maybe get drowned. So getting water is a problem. (Teacher) (PE, Graves et al., 2013, p.166)	Remote areas "Rainy season they spend most of their time in the field .. so if you are in the field, some of the fields where the latrines are so you see no need why you should not just [defecateJ in the maize and help yourself and continue working." (PE, Lawrence et al., 2016, p.558)		
SOCIO-CULTURAL: SAFETY				
Barriers	Safety Three schools also complained that health education materials were stolen by villagers. (AS, Lansdown et al., 2002, p.429)			
SOCIO-CULTURAL: CULTURE				
Barriers	Language In future a translation panel may be required to address regional dialect disparities. There were also reports of unwanted messages. (AS, O'Donnell, 2015, p.8) Furthermore, some questions included in the interactive messaging were reported as "not proper for people" This may be due to Somali translation which is different in different regions, highlighting the possible need for a translation panel in future. Others suggested it was not always clear what „the ask" is (i.e. the phrasing of questions) or there are unwanted questions which were not encouraging to reply to. (AS, O'Donnell, 2015, p.24)	Stubborn against change in habits One school director also viewed hygiene behaviors as something achieved over time and requiring a "change in culture." He said that is was part of their culture to be stubborn against change in habits. (AS, Andrade, 2013, p.154) "…their role is to guide, to educate, change customs, but like you say, there are homes that are still a little stubborn, and I think that's part of our culture. You achieve it over time." (PE, Andrade, 2013, p.154) Traditions and taboos "In situations where the daughter in law is in the toilet and the father in-law comes to use. after she discovers it was him she gets scared to use the toilet again and goes to the bush instead .... If we are fair		

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		men we can use the same toitet." (PE, Lawrence et al., 2016, p.558) "When people used to go to the bush, they would find our people there and it didn't show respect. In other cases, someone's husband would find another man's wife and that is not good." (PE, Lawrence et al., 2016, p.558) "Change is there because a lot of people have understood and accepted that having a latrine at home is a respectful thing, even when you have an in-law. In the past, they would bump into each other in the bush while defecating. But now they can tell when an in-law is in the latrine so they would wait." (PE, Lawrence et al., 2016, p.558) However, several inhibiting factors were discussed. These included sociocultural traditions and taboos regarding sharing a toilet facility and embarrassment using a latrine, because others may see someone enter and know that he or she is defecating. (AS, Lawrence et al., 2016, p.557) "You can't find a father is using a toilet [and] the in-law using the same toilet, so it is better that you just go in the bush as if you are trying to fetch for firewood. You just go there and help yourself ... but I think they are changing for the better." (PE, Lawrence et al., 2016, p.557) "There is a tradition that in-laws like the daughter in-law and her father or mother-in-law cannot use the same toilet. This is what has made behavior change very difficult in our community." (PE, Lawrence et al., 2016, p.557) Several individuals conveyed motivation to use a toilet to eliminate the potential embarrassment of "meeting the in-laws in the bush while defecating". (AS, Lawrence et al., 2016, p.557) "It became easy, even for those who live with their in-laws. It was taboo to use the same toilet. I used to tell them ... it is better to mix shit in the toilet than in the stomach." (PE, Lawrence et al., 2016, p.557) "Those people . . . when we talk about polygamous families - where one woman would refuse to use [the latrine] saying, 'I can't use the same toilet as the junior wife or senior wife.'" (PE, Lawrence et al., 2016, p.558) "The Lamba [an ethnolinguistic group in Lufwanyama] tradition of using latrines was not		

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		encouraged. You would find that only the parents were supposed to use that latrine, [while] everyone [else] is supposed to go in to the bush." (PE, Lawrence et al., 2016, p.558) "There is u tradition that in-laws like the daughter in-law and her father or mother-in-law cannot use the same toilet. This is what has made behavior change very difficult in our community." (PE, Lawrence et al., 2016, p.558) "Some households construct latrines, but their use is restricted by the belief of not sharing latrines at family level. For example in such beliefs a woman cannot share a latrine with her farther/mother in law". (PE, Malebo et al., 2012, p.38) Kilimo Kwanza latrine was not liked as majority of the respondents felt unhappy to use composited feces as it is uncommon in their areas. (AS, Malebo et al., 2012, p.42) "Some people do not see the importance of having latrines due to their cultural beliefs or environment in which they live (near forest). They are not convinced on the importance of latrines and they find it easier to defecate in the forest." (PE, Malebo et al., 2012, p.55) "They were so ashamed. They said it was taboo to go and look for shit and bring it back to the village. It was unheard of. This really touched them." (PE, Lawrence et al., 2016, p.556)		
		Cultural background ... the long traditional dress for Zimbabwean women inhibited them to work as latrine builders. The dressing, which they were given after training (work suits and overalls) were considered to be in appropriate in their cultural setting. (AS, Katsi, 2008, p.395) Cultural norms that exist can paradoxically both inhibit and encourage latrine use. (AS, Lawrence et al., 2016, p.558) Another NGOs notes that an additional challenge in involving the slum dwellers is how to bring together people from different cultural backgrounds. (AS, Schouten and Mathenge, 2010, p.821)		
SOCIO-CULTURAL: DIVISION OF LABOUR				
Facilitators		Division of labour		

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Interview responses indicated that CLTS has positively impacted women's labor, particularly in fetching water. (AS, Adeyeye, 2011, p.22) CLTS facilitators take the gendered division of labor into account when structuring their CLTS interventions. (AS, Adeyeye, 2011, p.23) CLTS facilitators ask the women about water sources and the quality of water, knowing that men do not have the same experience and would not have answers. Meanwhile, they talk to men about constructing hardware (latrines, bathing areas) and working with the borehole contractors, as women would not generally be involved in that work. (AS, Adeyeye, 2011, p.23)		
SOCIO-CULTURAL: ETHNICITY				
Barrier		Ethnicity Results also show that people from some ethnic groups do not appreciate the importance of sanitation technology due to the nature of their activities; nomadic life that leads to frequent shifting from one place to another in search for food for themselves and pasture and water for their animals. (AS, Malebo et al., 2012, p.55)		
SOCIO-CULTURAL: LAW/LEGISLATION				
Barrier		Corruption Exclusion based on subsidy also occurred due to politics, caste and clientelism. For example, in Killod GP in MP, support for toilet construction was biased towards households politically allied with the village leader. This resulted in exclusion of the most vulnerable sectors of the GP, such as widows, tribal groups and oustees (displaced communities from a nearby reservoir) that had settled in the village. (AS, Hueso and Bell, 2013, p.8) An anonymous DDWS employee stated 'corruption leads money to stay with people who have power. Funds sent from the centre are first skimmed by the states, then districts and blocks and finally by village leaders'. (PE, Hueso and Bell, 2013, p.11) By-law The groups have informal by-laws and one elected person is responsible to ensure the use and maintenance happen according to the by-laws.		

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Nevertheless, there is a concern that users are in most cases tenants with no rights to the land on which the latrines are built. (AS, Bruck and Dinku, 2008, p.14) Crime Also, according to the CBOs, the communal sanitation facilities suffer from 'water cartels' in slum areas that vandalize the facilities. This is because the communal sanitation facilities sell water for prices three times lower than the price of commercial water vendors. (AS, Schouten and Mathenge, 2010, p.821)		
Facilitator		By-law The establishment of community by-laws that linked water and sanitation was another driving force for sustainability….because water and sanitation were tied together…. I think this was very wise. The by – law required every household in a community to have a pit latrine and then they could get a borehole of course after contributing the money also (KI Pallisa). (PE, Kiwanuka et al, 2015, p.102)		
SOCIO-CULTURAL: MINORITIES				
Barrier		Language Language barriers for effective RHSP were frequently mentioned in relation to the Dao and Xa Pho´ groups (highland), particularly for women and the elderly who spoke limited Kinh. (AS, Rheinländer et al., 2012, p.609) Traditional ethnic life styles Most province, district and communal stakeholders acknowledged these fundamental different contexts, but perceived the highland areas as difficult to change mainly due to 'traditional ethnic life styles' (PE, Rheinländer et al., 2012, p.608-609)		
SOCIO-CULTURAL: SOCIOECONOMIC STATUS – ROLE MODEL - AUTHORITY				
Barriers	Poverty Teachers also perceived the poverty of communities as an important barrier for creating new child hygiene habits, particularly in the highland. (AS, Xuan et al., 2014, p.8)	Poverty reversion to open defecation affected poor households which were not able to sustain improved sanitation practices since their latrines were of low-cost, temporary construction requiring later	Poverty SANITATION FINANCING: Sanitation teachers indicated the following constraints to persuading people to build a latrine or to take a sanitation loan to build one: • Some households are unable to buy	

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
	The economic conditions of many households are difficult (Xa Pho group), so they still do not have soap and water for washing hands. (PE, Xuan et al., 2014, p.8)	upgrading or ongoing maintenance. (AS, Hueso and Bell, 2013, p.8) Because of an unreliable poverty classification system, hardware subsidies provided to households with BPL cards failed to promote inclusion of the poorest. (AS, Hueso and Bell, 2013, p.13) Extreme poverty resulted in both practical and psychological constraints on behavioural change for these women. Unlike the majority of mothers in the study, these women often had to seek employment outside of the home, in order to meet bare subsistence needs. This presented a number of practical constraints on their ability to change hand-washing practices. (AS, Langford and Panter-Brick, 2013, p.138) However, the findings reveal that poor people opted for latrines of lowest construction costs using locally available materials like tree poles, mud and grass. (AS, Malebo et al., 2012, p.37)	latrines or to take a sanitation loan. (AS, Emerging Markets Consulting, 2014, p.27)	
	Illiteracy There are some barriers to adoption, such as the fact some are illiterate (AS, O'Donnell, 2015, p.12)	Lack of hierarchical pressure The Bylaws were mentioned to only influence very few of the households due to laxity in their implementation and lack of regular inspection in the households. (AS, Malebo et al., 2012, p.41)		
Facilitators		Social status Improved social status of households with safe latrines and tubewells could be a factor driving the implementation of hygienic practices. Narratives indicated that ownership of a latrine or tubewell raised social prestige and was a matter of pride for the respondents. Defecating in the open was regarded as awkward but normal in the past but is now considered shameful and risky for health. (AS, Akter and Ali, 2014, p.6) 'Defecating in the jungle or open place was the tendency in the past. We felt embarrassed about it, but had no alternatives. Now we feel proud to own a safe latrine, and are ashamed of the old sanitation system.' (PE, Akter and Ali, 2014, p.6) Poverty was a main factor in lack of ownership of safe latrines, leading to use of shared latrine or defecation in the open. Poverty hindered buying of slippers, soap, brush, and latrine cleaning agents. Poor and ultra-poor households extensively cited poor economic condition as a barrier in practicing hygiene measures, rendering them as unsuccessful households. (AS, Akter and Ali, 2014, p.7)	Role models from the community All 'first movers' reported travelling to observe the constructed Skyloo at H7's house and discussed the purchase with H7. H7 was identified as a leader in his local community. His older age and relatively high wealth were identified by 'first movers' as providing him with high levels of connectivity and social status amongst tbe community. (AS, Cole et al., 2015, p.295) I started this group, it's me, ... Because I knew those people and that we can work together and so they agreed. That's why we made this group… Now from there people were flocking to see the sample because (we used) our money (H7, male). (PE, Cole et al., 2015, p.295)	

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		Now we need more soap and water for cleanliness compared to the past. It is difficult to buy extra soap, so we do not have it all the time. We are poor, so it is difficult for us to practice hygiene behavior. (PE, Akter and Ali, 2014, p.7) **Hierarchical pressure** "[Hierarchical pressure] does work as well ... there was a time when the headmen themselves didn't have pit latrines, but when you involve them and they see the benefits, they would put by-laws within the villages that one who doesn't have a latrine will [have a penalty put in placeJ ... and then referral to the Chief. And the Chief is very influencial in that he doesn't spare them. Just mention that you will be taken to a chief then someone will get scared." (PE, Lawrence et al., 2016, p.556) "Headmen tell their subordinates to build latrines. Like for the Chiefs, they showed example by building latrines at their households." (PE, Lawrence et al., 2016, p.556) "The chief commanded that each individual is supposed to dig a toilet: if it's found that a person does not have a toilet, one is supposed to go and explain why he doesn't want to dig a toilet." (PE, Lawrence et al., 2016, p.557) Leveraging community leadership, including traditional chiefs and village headmen, is a powerful tool for encouraging communities to embrace the CLTS program and mobilize to construct and use toilets. (AS, Lawrence et al., 2016, p.559) **Leadership development** Same people were very shy. Like me! But I think that the club solved my problem. I've become a leader ... (Facilitator 0603-001). (PE, Brooks et al., 2015, p.386)		
SOCIO-CULTURAL: SOCIAL CAPITAL				
Facilitator		**Social connection** After the establishment of the VDC we can now take decisions sitting together to solve our individual, group and community problems especially on WatSan. (PE, Sarker and Panday, 2007, p.25) CHC: With the health clubs, members entered into a dynamic which formed and strengthened social	**Developing a culture of cooperation** a group of five people said "no we cannot handle this issue individually. Let us make a group". So we organised a group, namely a cooperative group so that whenever someone is lacking materials the other side can assist (H6, male). (PE, Cole et al., 2015, p.295)	

Recipient-related contextual factors	Sanitation and hygiene messaging	Community-based approach	Social marketing approach	Elements of psychosocial theory
		bonds. People became more likely to help each other, with respect to both club issues and issues to do with the wider community dynamic. (AS, Whaley and Webster, 2011, p.28) 'But when they come together they find there is more that binds them together than keeps them apart, and that realisation will make life easier for somebody in his home area because people will then find out that there's more to gain by staying closer to each other, by realising you are united'. (PE, Whaley and Webster, 2011, p.28)		
		Availability of solidarity mechanisms Strong cohesion and peer solidarity mechanisms at community level are important for the achievement of ODF status. Since there are always vulnerable households for whom the construction of a latrine might be beyond their financial or physical capacity (e.g. elders living alone, disabled people), these safety networks are important to the success of the approach. (AS, Jimenez et al., 2014, p.1111)		

AS: author statement; PE: primary evidence

Statements in red are originating from qualitative studies with a CASP-score < 8

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About this review

Diarrhoeal diseases are very common causes of death in low- and middle-income countries. Improved sanitation and hygiene reduce diarrhoea, but adoption remains a challenge.

This review assesses the evidence for two questions: (1) how effective are different approaches to promote handwashing and sanitation behaviour change; and (2) what factors influence the implementation of these approaches?

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